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ABSTRACT

Twenty-nine case studies presented in this document, all drawn from the ERIC data base and thus accessible through ERIC microfiche collections, have as their common denominator the efforts of individuals, organizations, and agencies to affect and/or accommodate change through environmental education. Their targets, representing all age levels, range from single classrooms and small communities to national and international audiences. Papers are intended (in the context of this volume) to represent the spectrum of "environmental education change agent" activity of the present and recent past. An attempt was made to exclude reports of "environmental activist change agent" activities, as distinguished from "environmental education change agent," for reasons discussed in the foreword. However, several papers dealing with environmental activism were selected because of their implications for education. Titles and authors of papers are included in the table of contents. A short abstract and original source (together with ERIC ED number) are provided on the first page of each paper. (Author/JN)

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ENVIRONMENTAL EDUCATION IN ACTION VI:
CHANGE AGENTS IN AND FOR ENVIRONMENTAL EDUCATION

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and Environmental Education
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ENVIRONMENTAL EDUCATION INFORMATION REPORTS

Environmental Education Information Reports are issued to analyze and summarize information related to the teaching and learning of environmental education. It is hoped that these reviews will provide information for personnel involved in development, ideas for teachers, and indications of trends in environmental education.

Your comments and suggestions for these publications are invited.

John F. Disinger
Associate Director
Environmental Education

This publication was prepared with funding from the National Institute of Education, U.S. Department of Education under contract no. 400-78-0004. The opinions expressed in this report do not necessarily reflect the positions or policies of NIE or U.S. Department of Education.

PREFACE

This is the sixth volume in ERIC/SMEAC's Environmental Education in Action series, which reports case studies in many of the aspects of environmental education. For the first five volumes, "new" papers were solicited as appropriate to the topic at hand. For this volume, papers already in the ERIC system served as a pool from which appropriate entries were selected.

Earlier volumes in the series include:

Environmental Education in Action I: Case Studies of Selected Public School and Public Action Programs, by Clay Schoenfeld and John Disinger, January 1977, ED 141 185;

Environmental Education in Action II: Case Studies of Environmental Studies Programs in Colleges and Universities Today, by Clay Schoenfeld and John Disinger, February 1978, ED 152 557;

Environmental Education in Action III: Case Studies of Public Involvement in Environmental Policy, by Clay Schoenfeld and John Disinger, December 1978, ED 168 886;

Environmental Education in Action IV: Case Studies of Teacher Education Programs for Environmental Education, by Mary Lynne Bowman and John F. Disinger, December 1980, ED 202 665; and

Environmental Education in Action V: International Case Studies in Environmental Education, by Margaret E. Cowan and William B. Stapp, December 1982, SE 039 605.

The editor wishes to thank the authors, institutional and individual, of the papers contained in this volume for their willingness to share them with the environmental education community, and the environmental and educational communities at large.

Papers are arranged alphabetically by author, individual or organizational.

J. F. D.

December 1982

ABOUT THE EDITOR

John F. Disinger is Associate Director of the ERIC Information Analysis Center for Science, Mathematics, and Environmental Education, and Professor of Environmental Education in the School of Natural Resources of The Ohio State University. He also is Associate Director of the EPA Instructional Resources Center at Ohio State. From 1956-1970, prior to coming to Ohio State, Dr. Disinger was a junior high school teacher in the West Irondequoit, New York, School District. In addition to contributions to periodicals such as *Contemporary Education*, *Environmental Science and Technology*, *The Environmentalist*, *Journal of Environmental Education*, *Journal of Soil and Water Conservation*, and *Journal Water Pollution Control Federation*, and to the *Current Issues* Yearbooks of the National Association for Environmental Education, he has been involved as author or editor of a number of ERIC/SMEAC publications, including four of the earlier titles in the *Environmental Education in Action* series. He is currently treasurer of the National Association for Environmental Education, and a member of a number of other national, state, and local organizations involved in environmental education.

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INTRODUCTION

The 1982 edition of the Thesaurus of ERIC Descriptors defines change agents as "persons or groups who attempt change, aid in its accomplishment, or help to cope with it." This definition, of course, is an apt description of many of those involved in the many facets of environmental education as they have attempted to forge a union of environmental information with educational techniques and settings, for the purpose of fostering both environmental and educational change.

Papers in the compendium of case studies, all drawn from the ERIC data base and thus readily accessible through ERIC microfiche collections, have as their common denominator the efforts of individuals, organizations, and agencies to effect and/or accommodate to change through environmental education, broadly defined. Their targets range from single classrooms and small communities to national, and international, audiences.

These papers have been selected from several hundred possible candidates, as reported through ERIC, and are intended in the context of this volume to represent the spectrum of "environmental education change agent" activity of the present and recent past. Opinions may differ as to whether or not they are the "best," most representative examples available; another selector-editor might well have drawn an entirely different set from the pool of possible entries.

An attempt was made to exclude reports of "environmental activist change agent" activities, as distinguished from "environmental education change agent" activities, for reasons clearly elucidated in John Hug's Two Hats essay (page ix). The several papers in this collection which deal with environmental activism were selected because of their implications for education, as indeed were all papers in the set.

The entire ERIC data base, not just the portion of it processed through the Science, Mathematics, and Environmental Education Clearinghouse (SMEAC), was scanned in making selections. Thus, papers originally processed by several of the clearinghouses appear. Those who wish to seek them out will find many other papers which might have been included.

FOREWORD: TWO HATS*

John Hug

It would appear that environmental educators have a bad case of the "two hat" problem. We have come by the problem naturally and therefore, we have paid little attention to it.

The problem is simply that industry, utilities, labor, business, media and other segments of the population and the general public have consistently recognized only one hat when talking about environmentalists and environmental educators. It is not uncommon for dedicated environmental educators to be summarily dismissed as troublemakers--environmentalists. This one hat view is easily explained because environmental educators are almost always environmentalists. Perhaps definitions will help clarify the problem.

Any world citizen who advocates with greater or lesser action that wrongs against our environment must be stopped is an environmentalist. Perhaps the negative reputation environmentalists have stems from the dramatic and radical actions of a few.

An environmental educator, on the other hand, is any world citizen who uses information and educational processes to help people analyze the merits of the many and varied points of view usually present on a given environmental issue. The environmental educator in not the "mediator," "trade-off specialist" or "negotiator," but a developer of skills and an information analyst who prepares the people (from any segment of the population) who will participate in environmental decision making.

Environmental educators, therefore, need to be as "value fair" or "value free" as they can when working in this role. They must scrupulously strive to get all the facts, examine and illuminate all the viewpoints, and keep from letting their own particular positions (as environmentalists) from mixing with their roles as educators.

My suggestion is simply that environmental educators make an effort to clarify the two distinct roles. At every opportunity, we should emphasize the neutral nature of environmental education activity. Strong advocacies are all around us, each using the techniques of persuasion and propaganda to build their constituencies. We must ourselves be familiar with all sides, stand firm for each advocate's right to be heard and provide a rational stage for informed debate.

Environmental educators have the right and the duty to be environmentalists, but the dual roles must adhere to the original premise--to keep each hat on its proper head while utilizing to the fullest the professional skills of the environmental educators.

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*From A Report of the North American Regional Seminar on Environmental Education, organized by The Alliance for Environmental Education. Columbus: ERIC/SMEAC, 1977. (ED 143 505).

ENVIRONMENTAL EDUCATION IN ACTION VI:
CHANGE AGENTS
IN AND FOR ENVIRONMENTAL EDUCATION

LEARNING BY DESIGN[*]

American Institute of Architects

A number of established professional organizations maintain an interest in environmental education and provide services to its practitioners. This is, of course, due to commonalities in goals and objectives. In the "Preface" to Learning by Design, the Public Education Committee of the American Institute of Architects explains its views on environmental education and how it continues to work toward them.

Architects and Environmental Education

Architecture is only one of the many forces affecting the environment, but it is one of the most important. Today's architects are concerned with environmental education because they are concerned with achieving and preserving quality in the environment. For this to happen on a meaningful scale in the United States, there must be a widespread public expectation and demand for quality in the environment.

Aware citizens can make better choices. They require buildings designed to a human scale, streets designed for safety, furniture designed to fit the human body, classrooms designed for learning, parks designed for rest and recreation and public buildings designed to express the values of the community.

The human-designed environment is the architect's particular area of domain. What is built, why it is built and where it is built are all a part of the profession's responsibility. The architect, in collaboration with the client, strives to achieve an architecture of consequence. Architecture has a personal and often dramatic effect on everyone. The architect relies on the public's participation and interest in the design process, for it is that interest that stimulates the architect to achieve work of significance. The public should be an educated participant.

No other art form so completely pervades our daily lives. We live, work, study and play in our buildings. Our surroundings affect our moods and temperaments; certain buildings, parks, plazas and streets lift our spirits, others diminish them. If we are to influence our architecture - and its lasting effects - we must embark on a strong and pervasive environmental education effort.

Role of The American Institute of Architects

The American Institute of Architects (AIA) is the national organization of the architectural profession, established in 1857. The AIA fulfills the basic goals of maintaining the standards and competence of architects. The following statement from its Bylaws gives clear expression of the ideals of the profession:

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[*] *Public Education Committee, American Institute of Architects, "Preface" to Learning by Design. Washington, DC: 1735 New York Avenue, NW, 1981 (ED 213 590). Reprinted by permission of American Institute of Architects.*

> "The objects of The American Institute of Architects shall be to organize and unite in fellowship the architects of the United States of America; to combine their efforts so as to promote the esthetic, scientific, and practical efficiency of the profession and building industry by advancing the standards of architectural education, training, and practice; to coordinate the building industry and the profession of architecture to insure the advancement of the living standards of our own people through their improved environment; and to make the profession of ever-increasing service to society."

Membership in AIA is open to every architect licensed to practice in the United States. Currently, the membership of the AIA is composed of approximately 30,000 licensed architects in over 200 local chapters. The Institute's national office is in Washington, D.C.

Since 1966, the AIA has been involved in environmental education - working on the national level to help clarify issues and develop methods and materials for raising the public consciousness of this vital issue. The AIA has been instrumental in providing the general public - and especially school-age children who will become decision-makers as adults - with a better understanding of the factors that influence the nature of its physical surroundings. Our objective has been a thoughtful citizenry, equipped with skills and values, taking reasoned action necessary to shape cities, towns and countrysides into better places to live, and remaining active in efforts to ensure that these will continue to be better places in the future. That is why architects, both individually and collectively, have supported environmental education and have become activists deeply involved in environmental education. Participants have taken many roles: legislative activists, theorists, consultants, architect/educators, community workshop organizers and civic speakers.

The group within the AIA that carries on this task has been known variously as the Task Force on Primary and Secondary Education, the Elementary and Secondary Education Committee, the Environmental Education Committee, and most recently, the Public Education Committee. Its primary objective has not altered: "To create an awareness of and concern for the human-designed environment as it relates to the total environment among all education sectors, pre-kindergarten through adult education."

In this role of environmental education catalyst, the AIA has developed several resources and services through the efforts of this committee. Informational materials for teachers introduced the need for integrating human-designed environmental concerns into the classroom. Information bibliographies were developed, with the first in 1970. Active support of effective legislation establishing environmental education at both the federal and state levels has been pursued.

Then, in 1980, the AIA conducted a survey to determine the needs of the education community in environmental education. Over 900 persons were contacted throughout the country, including state environmental education coordinators, primary and secondary school teachers, education administrators, graduate faculty of architecture and education, textbook publishers, representatives of nonformal education sectors - including television, children's magazines and museums - AIA components and Public Education Committee members. The overall response rate across all sectors of the survey was more than 50 percent.

The most significant findings of the survey indicated the critical need for access to high quality environmental education resource material, particularly instructional and activity guides, and training that would demonstrate how to integrate human-designed environmental education into existing curricula.

Faced with these findings and determined to meet these needs, the AIA Public Education Committee embarked upon an intensive period of planning which included consultation with professional representatives from the formal and nonformal education sectors. What emerged from these discussions was the structure of a system of interrelated material resources, the mechanisms for delivering these components and, perhaps most important of all, a conceptual framework - the basic notions - upon which the program would rest. The program has been entitled Learning by Design and surpasses all previous AIA environmental education activities, both in scope and in substance. The ultimate goal of this program is for every student to develop the ability to live in harmony with the natural environment and the skills to design a quality human environment.

Learning by Design

Learning by Design has five key elements: the conceptual framework, information resources, a workshop program, an action program and an information and technical assistance network.

The Conceptual Framework

Basic to the program is the articulation of the concepts and ideas that constitute its knowledge base. This framework explores the relationship between the human-designed environment and the total environment. It integrates the human-designed and natural dimensions of the environment and synthesizes the dynamics of environmental systems with those of human perception, values and behavior. The concepts are offered neither as a mandate nor as a new course of study, but rather as an approach for blending environmental principles into existing instructional programs.

Information Resources

In order to answer the needs indicated by educators for information about existing materials, The Sourcebook has been developed and disseminated. This publication is a compendium of information about existing programs, currently available teaching materials and persons and organizations that are vitally involved in environmental education activities. It is the centerpiece of the informational aspect of this program.

Workshop Program

The workshop program, conceived as a partnership between school representatives and architects, explores ways to make the human-designed environment accessible to students. This program features active collaboration between architects and educators in the development of new learning strategies and activities for classroom use.

Action Program

To meet the needs of teachers and architects in the classroom, the action program develops and disseminates activities. The development of learning strategies and guidelines, the testing of environmental education models, the development of an environmental education guidebook to local resources, and the production of classroom activities in a variety of formats are the major functions of this component.

Information and Technical Assistance Network

To ensure the widest dissemination of information related to environmental education newsletters, reports, position papers, presentations, and response to requests for materials and assistance are ongoing functions of the program, as is participation in meetings, seminars and workshops held by public and private organizations.

Learning by Design is a comprehensive approach to education for a quality environment. Educators will develop an enhanced perception of their surroundings and translate this into practical activities for their students. Architects will become a resource to involve students and educators in exploring the design process for decision-making. Together we will develop this program to create a demand for environmental quality.

HOW TO ORGANIZE A COMMUNITY ASSEMBLY, BASED ON A NEW ENGLAND TOWN MEETING FORMAT*

The Bolton Institute

As a follow-up to Habitat - The United Nations Conference on Human Settlements, held in Vancouver, British Columbia, in June 1976, the Bolton Institute of Wellesley, MA, under a grant from the Office of Environmental Education, U.S. Office of Education, organized three separate two-day community assemblies to consider the options for integrating human and environmental requirements in Vermont. This report is excerpted from the manual designed to assist others in the use of the Vermont Habitat model in bringing diverse community interests together to focus on and find solutions to community problems.

Assessing Quality of Life in Human Settlements

Inherent in any decision affecting human settlements should be the consideration as to whether or not the decision:

..is supportive to the natural environment;
..evaluates the demands on limited global resources;
..considers alternative resources which are local and renewable; and
..encourages an improved standard of living for those existing in degrading conditions.

A specific checklist applicable to the evaluation of any human settlements policy or plan might be:

Does the policy...

..avoid or mitigate any harmful impact on the environment?
..reduce the consumption of limited natural resources?
..conserve finite energy resources and encourage the use of alternative, renewable sources?
..encourage the use of natural materials which are reclaimable within natural systems or recyclable within an industrial production system?
..avoid planned obsolescence?
..encourage self-sufficiency?
..encourage employment of human skills?
..develop viable economic markets meeting the preceding criteria?
..require the protection of life from toxic and carcinogenic substances?
..apply multi-disciplinary perspectives to problem-solving?
..respect the dignity and intrinsic worth of all life?

---

*Excerpted from *How to Organize a Community Assembly, Based on a New England Town Meeting Format: A Technique for Determining Community Priorities*, by the Bolton Institute, 1977. (ED 174 495).

..provide shelter for all peoples which

- a. respects the integrity of their spirit?
- b. includes the fundamentals of heat, light, water, sewage?
- c. prevents harm from fire and other hazards?
- d. permits individuals access to shops, transportation, education, medical care and other public services?
- e. does not isolate one social, economic, ethnic or age grouping from the overall community?
- f. recognizes the negative effects of inadequate space within a shelter or among shelters?
- g. is not physically and visually designed to lessen one's sense of worth?
- h. is sensitive to the needs of children, the aged and the infirm?

In the Beginning...

The Habitat Assemblies were specifically designed to assist diverse community leaders to assess their community and establish priorities for the future to meet the human and environmental requirements of their settlement.

The model developed and tested in Vermont involved a two-day assembly using a primarily small-group dynamics technique to encourage productive community assessment and decision making.

This Habitat model is readily transferable to other subjects by appropriate changes in the background materials and the resource people who present the basic data on the first day. If some other subject is chosen as the focus, needless to say the sponsors must initially make a determination of objectives and delineate the scope of the Assembly.

Finances...

Ideally, the project should be adequately funded. Expenses for a two-day assembly based on the Habitat model include: salaries for staff (project director, consultants, assistants, facilitators, clerical assistance); meals for participants; expenses for speakers, resource people, staff (travel, meals, lodging); telephone, postage, printing; expenses vital to initial planning and assembling final report.

If finances are restricted, some of these expenses can be covered by in-kind contributions. However, the invited participants should not be expected to finance any portion. Broad community representation is vital to the success of the assembly. A two-day interruption in a busy schedule devoted to this project is sufficient contribution. No further impediments to attendance should be permitted.

Project Director

The sponsors should engage a Project Director as soon as possible after the decision is made to proceed with the project. The Director should have experience in organizing conferences and also be familiar with the subjects to be covered and with the objectives of the conference.

If the Project Director is not intimately familiar with the area which has been chosen as the focus of the assembly, it is important that a local consultant be retained. The consultant should meet with the Project Director early in the preparation to assist in the analysis of the target community, its character and the essential elements which must be presented for any meaningful dialogue.

Advisory Council

For the Habitat Assemblies a twelve-member National Advisory Council was organized. The Council was representative of the federal agencies involved in Habitat, the state agencies and the private sector.

A conference with some other subject focus would dictate a different representation on the advisory body; however, it is important to ensure the mix of public and private organizations and of the different government levels.

The Advisory Council should meet as a group in the formative stages of the project to make recommendations on the format. One meeting is probably sufficient. As materials are developed, they should be sent to the Council for their review and comment. The Council also serves as a reservoir of speakers, facilitators, and resource people for the assemblies.

Selecting Target Community

A key decision to a successful follow-up is to determine precisely the geographic area to be the focus of the discussion. The Habitat model appears to work well for a neighborhood, small town (12,000 population), small city (50,000 population), or a sub-state region (100,000).

The limit to the size of community chosen may be the ability to provide cross-section representation among the participants and at the same time keep the group small. Thirty to fifty participants appears to be the optimum number for meaningful involvement. For a large city it would be more profitable to divide the municipality into definable neighborhoods.

Facilities

Facilities for an assembly must be carefully chosen. The location must be convenient to minimize travel time by participants, but sufficiently isolated to discourage interruptions brought about by attempts to attend to other appointments between sessions. There must be a large room to allow all participants to sit around tables placed in a square pattern, with enough additional space along the walls for staff and resource people. It is important that this room be well ventilated and lighted - preferably with windows. The room must also have the capability to be darkened for films. Projection equipment and a projectionist must be available. Back-up equipment is helpful in case of malfunction, as well as an extra bulb, extension cord, etc.

Additional facilities are needed in appropriate number for the small group sessions. These should comfortably accommodate ten to fifteen people who are also seated in the square table configuration. This configuration lends itself well to group discussion. With all the participants facing each other there is no "lead" table and the group is thus talking together rather than being talked to. These rooms for small groups must be isolated to avoid distractions. Each must be equipped with easels, pads of newsprint and markers for the recorders.

Dining Facilities

Dining facilities should be available in the same building in case of inclement weather. Care should be taken to avoid using the dining room as one of the meeting rooms so that the meetings and preparation of the meals may be carried on simultaneously. This eliminates delay and confusion.

Overnight accommodations are necessary at the location for staff and resource people. The staff should be able to meet for dinner the evening before the conference for an in-depth briefing of the format and to review the facilities and the working agenda. It is also helpful if the staff meets for breakfast each morning to review any unexpected changes.

The Project Director should visit each site location before final decision is made. A conference should be held with the facilities manager to review requirements and to discuss prices for accommodations. In the Vermont experiments, representatives of the chosen establishments were extremely cooperative. They assigned a staff member to be constantly available to supervise the operation and to assist the Project Director in any last minute emergencies.

Drinking water should be available in the meeting rooms. Rest rooms should be convenient and public telephones available - but not too convenient. Messages for participants, unless of extreme urgency, should be held for coffee or meal breaks.

It is a great asset if the locations selected provide quality meals. In preparation for a two-day conference this is especially important. An inadequate menu can be tolerated for one day, but does not contribute to the success of a longer meeting. Comfortable meeting rooms and properly fed participants are important in ensuring proper response from the individuals attending. Food should be well prepared, served in a relaxed setting, and not too heavy in quality or quantity. We recommend the elimination of desserts at lunch time to encourage maximum participation at the afternoon sessions.

Background Materials

To assist the participants in the Vermont Assemblies to assess the operational components common to communities, base-line documents were produced under three major headings: Human Environment, Systems, and Natural Environment. The individual papers developed under these headings were:

Human Environment:
- Shelter
- Energy
- Industry
- Agriculture
- Recreation
- The Future
- Case Studies

Systems:
- Transportation
- Waste
- Education and Communications
- Health
- Technology
- Case Studies

Natural Environment:
- Ecosystems
- Air Quality
- Water Quality
- Land
- Case Studies

These working documents were not copyrighted and the participants were encouraged to reproduce them as they wished. Additional resource papers on World Resource Briefs, Vermont Resource Briefs, and on the local areas involved were also provided.

One of the goals of the project was to provide the participants with the beginnings of a resource library to support interest in the concerns which were addressed. This is vital to the continuation of action on the part of the participants after the conclusion of the assembly.

Facilitators

To ensure stimulating discussion sessions, a facilitator should be engaged for each of the small groups into which the assembly will be divided. These should be carefully chosen for their experience in small group dynamics and their familiarity with the general subjects of discussion. For the Habitat model these subjects included: the Vancouver Habitat Conference, planning for human settlements, or natural environmental concerns and their inter-relationship with human environmental concerns. The responsiblity of the facilitator is to encourage discussion within the assigned group in keeping with the framework of the design model. This requires great skill in handling the group, making sure each member is involved and participates in the discussion, limiting the more aggressive, assertive members to their share of the time, and encouraging the enthusiasm and energy generated in a productive manner....all this without seeming to impose on the group at all.

Recorders

Each group should be assigned a Recorder to capture the essence of the discussion by noting key words or thoughts on large sheets of newsprint in full view of the group. This technique is particularly important as it allows for instant correction if the group member does not feel that his point is properly understood. This is much more valuable than having a Recorder taking private notes. The newsprint sheets are collected after each session, labelled as to group and session, and finally transcribed and mailed to each participant for their records.

At two of the Vermont Assemblies members of the League of Women Voters acted as Recorders. We found them very reliable and experienced in recording ideas and meetings. They usually have some background knowledge of the subjects being discussed which tends to improve the quality of the reporting.

It is important to hold a briefing session with the Recorders prior to the beginning of the morning session on the first day so that all have the same understanding of what is required. Recorders can be used to handle the tape recorder for the speakers. Tapes should be labeled carefully to designate speaker's name and which segments of which session are being covered. The presentations can then be transcribed and combined with the Recorders' notes to provide a complete report of the entire assembly.

Resource People

Resource People should be chosen for their expertness in the subjects to be discussed in the Round Robin sessions on the morning of the second day. They also should have considerable experience in working with small discussion groups in order to successfully stimulate creative discussions following their presentations. In Vermont some members of the National Advisory Council were invited and acted as additional resource people, participating in individual and ad hoc small group discussions during breaks and at meals.

Contact should be made with the National Advisory Council, Facilitators, speakers, and Recorders about three months before the scheduled date. This allows sufficient time to establish a definite program and meet printing schedules.

Selecting Participants

Essential to the success of any program dealing with the consideration of goals for a community is the involvement of a group which is representative of a cross-section of that community. A listing should be made of the sectors within the community which should be represented - particularly those whose members do not normally interface with one another. The Local Consultant can assist in identifying local individuals who can represent the interests selected. It is of paramount importance to select people who are not only knowledgeable in the area they represent, but who are able to communicate easily with other people and who are receptive to new ideas.

Letters of invitation should be mailed approximately six weeks prior to the date of the assembly. With the invitation should be enclosed a brochure describing in more detail the concepts of the assemblies. It should also include a return postcard for their response.

The Local Consultant should be able to give a reasonable estimate of the level of response so that invitations can be extended with some advance anticipation of the number of participants who will attend.

The deadline for the return of the response card should be aproximately four weeks before the conference date. This allows sufficient time to mail the Habitat background papers to accepting participants and for mailing additional invitations if response is less than expected. In making additional choices in this situation, remember to keep the balance of representation in mind.

The assignment of participants to their permanent small groups needs to be carefully programmed to provide the community cross-sectional mix which is achieved in the overall group. This is controlled by the use of name tags. The participants' name tags are lettered in one color with the group assignment designated by a letter (A,B,C,..) in the lower right corner. Staff and Resource People are named in another color. The tags should be hand printed in large block print for easy reading across a discussion table.

Work Kits for Participants

A packet of basic information material should be presented to each participant at the registration table. This Assembly Kit might be packaged in an attractive folder appropriately printed with the assembly logo, the name and address of the sponsoring organization, and with a reference to the funding source. Pockets for materials are convenient.

The kit should contain:

- The Assembly Agenda
- Names and Addresses of Advisory Council
- Names and Addresses of Speakers and Resource People
- Names, Addresses, and Phone numbers of Participants
- Resource Briefs on the Target Community
- Habitat Background Documents
- Other Resource Material Pertinent to Topics to be Discussed
- Any Forms which will be Referenced During Assembly Discussions

Transportation

For the convenience of staff and resource people who might be traveling by private car, maps should be obtained from the conference center and mailed with the letter confirming arrangements with each person. The Project Director should receive from each speaker, resource person, and staff member a copy of their travel schedule so that a master schedule can be prepared for the purposes of coordination.

Those persons arriving by air will require ground transportation. A four-door sedan with a large trunk area should be rented for the duration of each conference to facilitate the movement of equipment, supplies, and personnel. A staff member should be assigned as driver and given the responsibility of meeting planes for arrivals and departures. The exact times the speakers and resource people are to be on hand should be communicated to them when the first contact is made. The times agreed upon should be confirmed in writing prior to the conference, and departure times re-checked at the pre-conference briefing the night before the beginning of the assembly.

Press

The press should be notified of the assembly and encouraged to cover the speakers' presentations on the first day. The press should not be invited to cover the small group sessions to eliminate any possibility that their presence might prohibit a free and informal exchange of concepts during these work sessions.

The Habitat Model

Format

The Bolton Institute, through the use of a series of two-day Town Meetings - or Assemblies - was able in Vermont to cause disparate sectors of three communities to interact constructively and effectively in dealing with the problems of the quality of human settlements and the natural systems which sustain them.

Three assemblies were held. The two which were in the original proposal were held in September 1976 and involved local residents from the city of Burlington (population 38,633) and the town of Brattleboro (population 12,229). The third assembly which was conducted in May 1977 was organized at the request of the participants of the Burlington meeting and had as its focus the Chittenden County Region (population 100,000 +, with Burlington as its largest city).

The format used brought together thirty people at each assembly who held key responsibilities in their communities with regard to meeting fundamental needs of the citizenry; e.g., housing, water systems, waste removal, transportation, health delivery systems, financing, employment, etc. The community assemblies were a cross-section of representatives from local and state government, business, industry, educational institutions, and civic organizations. The participants were chosen carefully to provide a broad representative mix of the community.

The two-day assembly was an educational process during which the participants assimilated information and diagnosed their community, using this information and their own perceptions as the foundation for their diagnosis. Relevant materials were assembled for the meetings and a series of background documents were developed especially for the Habitat Assemblies. These working papers dealt with the three main topics of human environment, systems, and natural environment.

The format design brought together the elements necessary for a successful program - able speakers, a clear relationship between the parts, variety and change of pace, and ample opportunity for members of the assembly to participate. The major divisions of the two-day sessions were International, National, and Local.

Agenda

The keynoter on the morning of the first day directed attention to the Vancouver conference, and the U.S. Response; and a discussion of the Habitat Documents. This was followed by one of the films developed for the U.N. Conference, Habitat/U.K. '76. The National focus was developed by a representative from the Habitat National Center. Films dealing with energy were used in this part of the program. The luncheon speaker was an expert on the problems of small cities.

After lunch the participants were divided into three groups and assigned a facilitator and a recorder each. The small groups had been carefully designated in order to achieve the broad mix of the larger group. With the assistance of the background documents developed for the purpose each group devoted the afternoon to assessing the community, its history, its development and its present character or image as a human settlement.

After dinner there was a presentation on growth and its implications for the future.

The second day began with a film of general interest and then the participants returned to their assigned groups for a round-robin dialogue. This provided an opportunity for an expert in each of the three major topics to make a brief presentation to each group on the far-reaching possibilities and implications in his field and to participate in a discussion with the members of each group.

After the morning break, each group reconvened to determine, in the light of the information which had been given them, five goals for the next decade to improve the quality of life in their community. Before breaking for lunch each group elected a spokesperson to represent it in the afternoon plenary session. The luncheon speaker dealt with the state's role in human settlements.

After lunch the group convened in plenary session to discuss strategies for change. The three elected leaders assumed the chairmanship of the group. Each presented the five priorities of his group and the entire group, after discussion, agreed on three top priorities. The plenary session was then divided into three self-selected groups to discuss each of the three priorities. Each group dealt with the resources in the community to achieve their priority goal and developed a plan of action toward implementation. The groups returned to plenary session for the three reports and to discuss how to proceed in the future.

Working Agenda

The following is the working agenda for the Habitat Model. This is the basic tool for the leaders of the assembly.

First Day

8:30 A.M. - Registration and Coffee

(Participants pick up folders, get color-coded name tags which have group letter assignment)

9:00 A.M. - Introductions. Project Director (Moderator) introduces all support staff and gives a little background sketch, pointing out to participants the page in their work kits which has names and addresses of all support staff.

Moderator introduces official of sponsoring organization.

Official briefly outlines primary goals and process and introduces international speaker

International

9:15 A.M. - International expert speaks on Habitat concept, U.S. final positions and domestic implications of those positions relevant to area of the Assembly

(First film should be on projector)

10:00 A.M. - Moderator thanks speaker and requests participants take their chairs and form two groups (pads and markers ready for each group).

Reporter and facilitator should each join one group. Goal of each group: to discuss their interpretations, questions, and opinions of the Habitat principles and the plan of Action and Symposium Declaration. Recorders outline discussion and major points on newsprint.

Facilitators briefly review the Declaration, Plan of Action, and Symposium Declaration in that order prior to discussion.

10:30 A.M. - Coffee Break

10:45 A.M. - Moderator introduces Habitat film (urban focus), pointing out that it was prepared for Habitat, and that each nation had to prepare three media presentations as part of their national preparation. All the national films are compiled and held at the University of British Columbia.

National

11:15 A.M. - Moderator introduces National speaker

11:45 A.M. - Adjourn for Lunch

Noon to 1:00 P.M. - Official introduces Luncheon Speaker-
Subject: Small City Problems

(During lunch put afternoon film into projector)

2:00 P.M. - Group breaks into three groups -- A, B, C. Facilitators allow ten minutes for participants to review working papers. Each participant takes one topic from each of the three sections and becomes the expert for the remainder of the afternoon. The participants undertake a discussion of the community focusing on the human environment, systems, and the natural environment in that order. All observations will focus on the community, its history, and its present circumstance or character.

Recorders record all points of the discussion on newprint pads on easels with magic markers in front of the group. Spend fifty minutes per unit. Therefore, from 2:10 to 3:00 P.M., participants discuss human environment. Facilitators go around tables asking each participant to contribute from the basis of the documents they have been assigned.

3:00 P.M. - Afternoon Break

3:20 P.M. - Three groups reconvene. Participants take their worksheet questions from folder and fill them out, giving them to the Reporters to be held for Project Director (The worksheet requested individual priority assessment.)

Section II of materials, Systems, is focused on addressing the community.

4:10 P.M. - Same process for Section III, Natural Environment

5:00 P.M. - Reporters relate to group where they have been in these three topical areas. The Facilitator then summarizes the links among the three facets.

5:15 P.M. - Cash Bar

6:00 P.M. - Dinner

7:00 P.M. - Moderator introduces Dinner Program
Subject: Growth and Implications for the Future

Moderator thanks speaker and adjourns first day session.

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(8:00 P.M. - Staff meets to assess first day, plan second day)

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Second Day

8:30 A.M. - Coffee (Film being set up)

8:45 A.M. - Film - General applicability
After film, Moderator requests participants to rejoin their three groups.

9:00 A.M. - Round-Robin Presentations

Human Environment
Systems
Natural Environment

Each speaker makes same presentation three times, once to each group, exploring new ideas and presenting insights for ten minutes

Participants discuss the concepts with the speakers for 15 to 20 minutes with Recorder taking detailed notes

10:30 A.M. - Coffee Break

10:45 A.M. - Participants return to original groups and accomplish the following:

1. Spend 5 minutes individually listing 5 things they would like to see happen in their community in aproximately the next decade to make it an ideal environment. Individuals then present their ideas to the group with Reporter noting them on newsprint.
2. Discuss all the ideas
3. Group selects from all ideas 5 that they as a group wish to cite as goals for their community.
4. These selected 5 are ranked in priority order.

(Instructions to facilitators and recorders: Record each priority on a separate sheet of newsprint, numbering each page as #1,2,3 priority. For each priority prepare a needs/resources/authorities chart.)

11:45 A.M. - The Facilitator has the group identify the needs-resources, and authorities required to achieve their three priorities.

12:05 P.M. - Each group selects a representative

12:15 - Break for Lunch

12:30 P.M. - Lunch - Group representatives, facilitators, and recorders meet at lunch at one table with Project Director to prepare the afternoon session.

Speaker is introduced

1:30 P.M. - All participants return to Plenary Session. The representatives from the 3 groups serve jointly as moderators. Each representative presents the 3 priorities from their respective group, plus needs, resources, authorities chart. Full group discussion follows on the 9 priorities and 5 of these are selected as goals and listed in order of priority. (30 minutes) The top 3 are selected as goals, the needs/resources sheet is compiled quickly by the Reporters to bring together the information that was developed relevant to the selected priorities.

2:30 P.M. - Participants voluntarily select which of the 3 priorities they would like to relate to. The Plenary group splits into 3 groups defined by the 3 priorities. Each group spends 30 minutes assessing the implications of their priority choice on the human environment, systems, and the natural environment with the help of the facilitators and the reporters.
In each of the 3 priority groups, the participants have two assignments: 1) assessment of the impact of the choice; 2) prepare a flow chart determining in sequence the kind of steps or action which must be taken to move their goal from an idea into reality.

3:30 P.M. - Participants return to Plenary session to present impact assessment and flow chart by group. Representatives again moderate and general discussion is held.

3:55 P.M. - Agenda for the Future - The Community. Moderators will decide whether participants should continue to interact on these goals following conclusion of the assembly.

4:00 P.M. - Closing Remarks -Project Director

4:05 P.M. - Completion of individual evaluation

4:10 P.M. - ADJOURN

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General Notes

It is important to choose carefully the days of the week and time of year for the assembly. In Vermont, mid-week days were considered the best possibilities because of the scheduling of most local legislative meetings. The Fall season seemed to be the most suitable for this area. This is a variable which needs to be assessed in each locality in a very realistic way. The fact that Vermont had such a high rate of acceptance from the invitees - especially in the two Fall assemblies - bears witness to the general wisdom of the choices.

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During the early part of the assembly, a review of what has been done on federal and state levels in the field which is to be the focus of the assembly is important. This can best be handled by choosing representatives from both of these levels to serve as resource people and/or speakers. This background serves to give the participants the perspective needed to proceed on a local level and emphasizes the role of inter-governmental cooperation.

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When working within a time frame of a two-day assembly it is important to provide variety and change of pace. While the main focus of the assembly format was the use of small-group dynamics, diversity was provided by the use of individual speakers, films, and other audio-visual materials. Films should be viewed by the Project Director to assure that they are beneficial to the purpose of the assembly. Knowledge of the exact running time for each film is necessary for proper scheduling.

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Tailor the program to the needs of your specific group, keeping in mind all the suggestions mentioned above and throughout this manual.

Conclusion

The Vermont Habitat Model was developed by the Bolton Institute to provide a process whereby a heterogeneous group of thirty people can proceed through an experience involving the assimilation of new concepts, a reassessment of existing information and an opportunity for an in-depth diagnosis of their community - its past, present, and future. This group dynamics model was successful in mobilizing and energizing a group of community leaders in each of three quite different communities in which is was tested.

The model developed for the Habitat follow-up assemblies was carefully constructed to bring the participants from one point of understanding of the issues to another and then another. The time element allowed for each of these was not totally adequate - by design. The apparent lack of sufficient time was somewhat frustrating during the assembly (as attested to by some of the comments on the individual evaluation sheets), but served the purpose of keeping the participants continually wishing they had more time to develop their thoughts on an issue, convince their colleagues to their way of thinking or interject some new idea. This left them at the end of a two-day experience with a sense of accomplishment, a better understanding of the elements within their community, but with a feeling that they could have been even more productive if more time had been available. This produced an optimum climate for developing a desire for some means to continue the dialogue and to continue to seek solutions to the problems which had been identified.

(Upon review of the evaluations after the Burlington assembly, the staff adjusted their procedure to create a somewhat more relaxed atmosphere without actually varying to any great extent the tight time frame.)

Evaluation

Individual Evaluation Sheets may be distributed to the participants at the adjournment of the assembly. They should be given a few minutes to complete them and return them before their departure. Evaluations are extremely helpful to the staff in assessing the effectiveness of the model and in making appropriate changes in the agenda of subsequent assemblies.

At the end

The Recorders' newsprint notes are assembled and assigned to the clerical staff for transcription and mailing to the participants as quickly as possible. A two week turn-around time is desirable. Tapes of the speakers' presentations, in cases where there was no prepared text, should be transcribed and distributed.

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All bills should be mailed to the Project Director for approval before being forwarded to the Financial Officer for payment. Vouchers for expenses from the speakers and resource persons should be accompanied by copies of airline tickets and any other appropriate documentation.

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Letters of appreciation should be sent within a week after the assembly to speakers, resource people and facilitators, etc.

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When all of the preceeding steps have been completed, a final report should be written stating the goals and objectives of the assembly, a summary of the project, the amount and type of community participation, the agenda model used, and an evaluation of the exercise.

Follow-Up

The Habitat Assemblies are designed to act as a catalyst for on-going community action. It is important that the initiative for this continuation come from within the local group if it is to be meaningful to the community.

If the participants of the assembly decide to organize an on-going group, the staff should be ready to provide whatever assistance might be approriate to encourage that effort.

Suggested Schedule

Select Project Director Local Consultant Editor/Writer	Six months
Choose Advisory Council Arrange meeting of Advisory Council Select location of assembly	Five months
Prepare Background Papers Invitational Brochure Selection of Speakers	Four months
Select Audio-Visual material Assemble staff - facilitators, reporters, resource people Select Participants	Three months
Mail Invitations Prepare kit materials	Two months
Print Programs and Name Tags Check participant responses - send out additional invitations if needed Reserve necessary ground transportation Select menus	
Mail study materials, if any Check final facilities arrangements Check travel arrangements of speakers and staff	Two weeks

Assemble kits Prepare name tags Assign participants to small groups Send press release to news media	One week
Staff and speakers arrive Dinner and Planning session for staff and speakers	One day
HANDLE ANY PROBLEMS CALMLY	Assembly - D-Day
Write letters of appreciation Pay bills as they are submitted Transcribe reporters notes and tapes of speakers presentations	One week after
Mail transcripts to participants	Two weeks after
Final Report	Two months after

NATURE WRITING:
GIVING STUDENT WRITING A USABLE TRADITION*

Paul T. Bryant

Typically, environmental education concerns itself with matters related to the scientific and/or socio-political-economic aspects of environmental quality. Many have spoken to the need to involve all areas of study in environmental education, but few have done so. This paper prepared at Colorado State University at Ft. Collins demonstrates the use of environment as a vehicle for pursuing excellence in a "traditional" area, English composition.

The old idea is still around (and I think still valid) that reading good writing helps a student become a better writer by showing the student the possibilities of the language for eloquent expression, encouraging an expanded vocabulary, and providing models for both style and rhetoric. And of course reading can give a student something to write about.

These uses also have their problems, unfortunately. If the readings are belles letters they do not offer direct models of expository writing. In this case the student can write only about the reading, writing as a critic, a completely different tradition with which the average student is little acquainted.

If the readings are from an essay anthology, the student may be confronted by an intellectually diffuse variety of topics, many of which are beyond that student's experience. The result is usually writing about the reading, or an artificial concoction of opinions synthesized only for the assignment.

An anthology focussed on one subject may provide topics for writing, and models, but such anthologies often lack a historical context. This may leave the student writing on "current events," or one current political viewpoint, again with insufficient background knowledge. As a further hazard, most composition teachers know the frustration of hearing a student excuse a poor grade on the ground that the instructor "didn't agree with my ideas."

In each case, both instructor and student face the constant temptation to spend most of the class's time and energy talking about the reading, which

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Presented at the annual meeting of the Conference of College Composition and Communications, Washington, DC, 1980. (ED 189 647).

is easy and fun, instead of doing writing, which can be hard work. Such difficulties have frequently prompted the planners of college composition courses to reduce or eliminate the use of readings.

The course I would like to tell you about offers solutions to these problems, and opportunities not usually available in traditional writing courses. This course, which I have taught at Colorado State University for the past three years, deals with nature writing. It is taught at the senior level. The students who take it come from a wide variety of majors, including forestry, the biological sciences, engineering, philosophy, art, the social sciences, and a few from English. All have completed the freshman composition requirement.

I do not describe this course on the assumption that all writing courses should be converted to nature writing, but rather in the belief that it constitutes an example, a model for teaching writing that might be adapted to a number of subject matter areas in which an historical tradition can be directly linked to the student's own writing and experience.

Perhaps the best way to begin is with a brief definition of what I mean by nature and nature writing. Nature in the purest sense is taken to be the natural world not controlled by human manipulation. In practice, this becomes a matter of degree.

Nature writing is, of course, writing about nature, but with very specific requirements: the writer must remain true to the objective facts of nature but at the same time present the human response to, and the human relationship with, nature. In a sense, this makes the nature writer responsible for both the requirements of the scientific writer and of the creative writer, also. By this definition, the nature writer must take what Louise Rosenblatt calls the efferent stance (transmit information) *and also* the aesthetic stance. Neither dull, depersonalized objectivity nor romantic fantasy will do. The successful nature writer must deal with real human beings in a real physical world. Neither *Bambi* nor *The American Journal of Botany* can qualify.

In my nature writing course, this definition is applied with some rigor both to the literature to be read and to the writing done by the students.

The course is unusual in that it has both lecture and laboratory, two hours of each, each week, for a three-credit-hour course. The lecture time is spent studying the literary tradition of nature writing, primarily in England and the United States, although we do trace the roots back to ancient Greece and the Old Testament. The laboratory time is spent in writing, analyzing student writing, analyzing models of nature writing, and taking short field trips to generate common subject matter for writing assignments. Perhaps a brief description of the lecture and laboratory, respectively, will show how the course operates and what the students are able to gain from it.

Current textbooks for the course, used both in lecture and laboratory, are John Conron's anthology, The American Landscape, Loren Eiseley's The Immense Journey, Aldo Leopold's A Sand County Almanac, and Joseph Wood Krutch's The Desert Year. In addition, readings on reserve in the library include selections by Edward Abbey, Sigurd Olson, Sally Carrigher, and Ann Zwinger.

The lecture portion of the course is taught very much like a literature survey course, with heavy emphasis upon the cultural and intellectual history underlying the nature writing tradition. We begin by examining the attitude toward nature, and toward the human relationship with nature, implicit in the Judeo-Christian and Classical traditions. From that we move quickly through the reports of Renaissance explorers (considering, among other things, what assumptions could lead them in all honesty to report some of the fictitious wonders about which they wrote). Always we keep before us the assumptions each age made about nature, and how these assumptions shaped what and how they wrote about nature.

The modern tradition of nature writing might be said to have begun with the eighteenth century, although in America the Puritans in the seventeenth century did much to establish ideas about nature that still affect our thinking. We consider the Puritans, the Deists of the eighteenth century, and the Romantics and the Realists of the nineteenth century, always through the medium of the nature writers of each age. Along the way we make connections with the scientific and philosophical thinking of each age on the one hand, and the art (particularly landscape painting) of each age on the other.

By the middle of the semester we have run through what amounts to a crash course on western civilization, and the students are ready to study nature writing in the twentieth century, beginning with the transitional figure of John Muir. With such a background, the students begin to see behind the writing of this century the assumptions and perceptions we have inherited from the past. When they read Krutch, they can hear the voice of Henry Thoreau. When they read Eiseley they begin to understand how a respectable scientist can have a mystical experience floating down the South Platt River. They become conscious of the complexity of human thought and human experience that underlies any good writing. And, wonder of wonders, they begin to realize that such complexity and richness can underlie their own writing when it becomes authentic expression and not just mechanical fulfillment of a class assignment.

For the first half of the semester, the students do not always see the connection between what they are doing in lecture and what they are doing in laboratory, but midway in the course, when we begin reading modern nature writers and analyzing their work, not only as parts of a tradition but also as models from which the students can draw techniques, elements of style, and modes of development, the coherence of the course begins to dawn on them. At that point, they begin to learn to use, on their own writing, some of the analytical techniques we have employed in studying the tradition. For some it is the first time in their lives they have made any direct connection between what they are doing and history.

Two progressive frameworks are used in laboratory, more or less simultaneously. One progression is from the stance of personal expression by the writer through a gradual distancing of the writer from the work until the emphasis is less on personal expression and more on giving the reader a new experience of nature through the medium of writing. In achieving this progression we discuss such concepts as Keats' negative capability and Eliot's objective correlative. We consider ways in which we can, as writers, move from a fairly naive impulse to put our feelings into words, to a more sophisticated consideration of ways to create in the reader's experience a particular set of reactions. In short, we move from writing as a private behavior to writing as a social act directed toward others.

In the process, students learn to achieve critical distance from their own writing and so see it as something to be consciously crafted. When students can finally see their writing as an artifact to be shaped and polished for a purpose, rather than merely a blurting out of their ephemeral feelings, then it is possible to teach them style and rhetorical technique. Then they can adopt a given point of view consciously, and create not a naive shadow of themselves but rather a persona to be perceived by the reader.

In the meantime, writing assignments also follow a pattern related to a set of modes of discourse. This set is somewhat modified from the traditional description, narration, exposition, and argumentation of Alexander Bain, but it is based on that well known quarter. The four we use, in the order in which we take them up, are description, appreciation, interpretation, and persuasion. As you can see, Bain's second element, narration, is replaced by appreciation, and his third, exposition, is called interpretation, really only an elaborated form of exposition. Finally, I prefer to speak of persuasion rather than argumentation because I try to teach my students non-adversarial modes of persuasive writing. Perhaps a brief description of what we try to accomplish under each of these headings will be useful.

We begin our laboratory writing with description. Our first exercise is to go together to a small picnic area on the campus -- "Sherwood Forest"-- to prepare two descriptions of the area. One is to be an objective, scientific description written in the style of a professional scientific journal. Such a description will give only factual data concerning size, location, apparent use, species of trees, birds, and mammals present, and so on. This will be the only "scientific" writing done this semester.

The second description is also to give any relevant objective facts about the area, but the speaking voice of the author is to play a part in this description. This description presents Sherwood Forest with the writer as a real, live human being perceiving the forest and reacting to it, rather than as a dispassionate sensing instrument. In effect, the second essay is a description of the experience of being in Sherwood Forest.

As we work on the descriptions together, on the scene, we do various exercises in perceiving -- for example, concentrating on one sense at a time and making notes on the stimuli available to that sense. This can be a very useful set of exercises, because most of us are so oriented toward vision that we tend to neglect the other senses in writing description.

Among other goals, this exercise is intended to fix clearly in mind the difference between scientific writing and the kind of nature writing we will be doing during the semester. All the work on description is intended to encourage the student to perceive clearly, accurately, and in detail, with all of the senses, and to use that perception in presenting a fully human response to what is perceived. By that I mean that the writer is to describe not only from a physical viewpoint, but from an intellectual and emotional viewpoint as well. The scientific writer will tell the reader about Sherwood Forest. The nature writer ideally will give the reader a perception of Sherwood Forest.

After perhaps three laboratory sessions on description, in which we criticize each other's work, analyze brief examples of effective description, and revise in consultation and alone, we move on to the writing of appreciation. We have already begun including the observer in the description, but as we work our way into the writing of appreciation we being shifting the writer's attention from expressing his or her own response toward creating in the reader a similar response. Such a response may include perception, emotion, evaluation, and it will require both efferent and aesthetic considerations.

In so presenting to the reader an experience that becomes the reader's, the writer inevitably uses both description and narration, thus adding the missing element from Bain's modes of discourse.

During the time we are working on appreciation, we use a laboratory period for a field trip to a small nature center along the Cache la Poudre River near the campus. The area is a wooded floodplain with a variety of vegetation, birds, and small mammals. This again gives the students a common set of experiences from which to write. This common familiarity with the general subject helps when the students are critiquing each other's papers. It also helps those students who have not had a great deal of outdoor experience feel more nearly on equal terms with those who have toured Glacier Bay in a kayak or climbed all the fourteeners in Colorado.

By the time the laboratory work has progressed to dealing with interpretive writing, the reading in lecture will have come up to the twentieth century. At that point, everything in the course begins to come together for the student. In the laboratory, the student has acquired skills in description, narration, and evoking appreciation. He or she can now bring those skills to interpretation, writing that combines rational understanding of processes and relationships with the experience of appreciation that is greatly deepened by understanding. The efferent and the aesthetic are both brought fully into play. Here particularly the writer must be true both to the objective, physical world out there, and also to the human consciousness perceiving it.

Again to assure that the students have direct experience from which to write, we devote one laboratory period to a trip to a small state park in the foothills just west of the campus. After a brisk hike up a steep trail we can stop and consider a panorama of mountains and plains. We can see a variety of plant communities; we probably have seen some Abert's squirrels and their relationship with the ponderosa pine; there will probably be hawks sailing the thermals above the cliff faces; we may with luck encounter mule deer or a rattlesnake; and we get a fine view of the hogbacks created from the overlying sedimentary beds when the Rocky Mountains rose. All in all, we have plenty of topics for interpretive writing.

Finally, near the end of the semester, the laboratory work moves on to persuasion. I use this term rather than argumentation because I encourage students to see that a reader may be moved to action on an issue (the purpose of persuasive writing) through judicious use of all the techniques of writing we have been developing through the entire semester. Description, appreciation, interpretation all, when well done, can move a reader to action without necessarily having to take an argumentative stance. A reader who becomes aware of the beauty of a peregrine falcon, and who understnds the role such falcons play in the biological community, will likely be persuaded to help save the peregrine falcon from extinction.

I do insist that the student write on a real issue with two arguable sides. Merely advocating beauty and truth is simple enough, but it doesn't achieve anything. Clear air or lower prices, a free-running wild river or a plentiful water supply -- those are the kinds of real choices facing environmentalists. Writing to advocate the choice of one desirable outcome over another, also desirable, outcome is more difficult than merely favoring "good" over "evil," but it is more responsible, and truer to the real world of human decisions.

As I have already suggested, by the middle of the semester the reading in the lecture has begun to relate very clearly with the writing in the laboratory. Not only do the students find, in that reading, useful models for their own writing, but also by understanding the ideas and assumptions behind the works they are reading -- Krutch's transcendentalism, Leopold's ecological pragmatism, Abbey's dialectic -- they begin to become more aware of their own assumptions and to analyze them. In the vernacular, they begin to understand where they themselves are "coming from." This makes them both better readers and more perceptive and effective writers.

The net result of this course is intended to be a series of connections: perceptive reading connected to effective writing; a whole cultural tradition of the arts and sciences connected to a given individual's perception of the natural world; and most important, close ties, perhaps for the first time, among a student's own perceptions and experiences, that student's own writing, and an established and clearly understood literary tradition. History, philosophy, art are at last joined with daily experience.

EDUCATING THE RESOURCES MANAGER[*]

Barbara B. Clark

How to go about educating professionals to achieve environmental goals has become a recurring theme in recent years. A clear statement is presented here by Ms. Clark of the Office of Dependent Schools, U.S. Department of Defense; it is based on the results of a study completed by the National Park Service of the U.S. Department of the Interior at the time she was employed by that agency. This paper was originally presented at the 1980 Annual Conference of the Soil Conservation Society of America.

Since the passage of the National Environmental Policy Act (NEPA) in 1969, life in this nation has changed for everyone. I need not recount those changes; it is sufficient to say that NEPA and all subsequent environmental legislation has altered significantly the way this nation does its business in both the public and the private sectors. The questions may now be asked fairly: Were we then and are we now prepared for the changes that have occurred and surely will continue to occur throughout our lifetime as environmental/conservation issues, coupled with energy scarcities, continue to hold the nation at bay? Do we know where we are headed as the impacts of what had been perceived as desirable laws sum and take hold out there in our future? Do we now, as a result of these new laws and regulations, have a sense of any national environmental goals that can provide us with clear guidance and direction as we face a future of vastly increased pressures on our resources - pressures that demand, in turn, particularly astute management of those resources?

As with many laws designed to change behavior through the regulation of procedures, environmental law has created a nation of dutiful compliers, but few true believers. Compliance alone cannot foster an understanding of the issues, which is needed now to more effectively and efficiently manage our environmental/resource problems. Somewhere between our initial enthusiasm for environmental quality and sanity and the promulgation and implementation of the complex regulations, Americans lost sight of the need to prepare to use the new tools that legislatures provided. Neither institutions nor professionals could have anticipated the impacts of new responsibilities that require so much: sophisticated information synthesis; attention to resource values; a team approach to problem identification and solution; considerably more sensitivity to the public; much more inter-institutional cooperation; broader, more holistic perspectives on the issues; and greatly modified organizational patterns that could accommodate the above requirements. I believe that many of us have recognized that new ways of doing business were in order, but we have been slow to react to the need. We now need to seek the means for retooling our organizations, our people, and our procedures to meet the challenges presented by our complex environmental problems and our equally complex regulatory remedies.

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[*] *From Economics, Ethics, Ecology: Roots of Productive Conservation, edited by Walter E. Jeske. Ankeny, IA: Soil Conservation Society of America, 1981 (ED 212 500), pp. 260-272. Reprinted by permission of the Soil Conservation Society of America.*

William H. Matthews, writing in Resource Materials for Environmental Management and Education has given us a strategy for change that would go a long way toward achieving more effective management of our resources. That strategy includes the following three elements: "A reorganization of our extensive substantive knowledge, the development of new functions and roles in the public and private sectors, and the creation of new educational programs and institutions to meet the critical needs of a wide variety of persons who analyze environmental problems or who make decisions concerning the environment" (Matthews, 1976). These strategies are interwoven, one with the other. My objective, however, is to discuss two of the elements, recognizing that the third must also be addressed with equal emphasis. In fact, I will touch upon it later in this paper. But the elements of the strategy I wish to stress here are the development of new roles and functions and the creation of educational programs.

Department of Interior Study

My thoughts are based on a recently completed study conducted by the Department of the Interior's National Park Service, titled Resource Managment: A Study of Selected Problems and Solutions.

As the nation's largest natural resources manager, the Department of the Interior had an interest in exploring the issues discussed in my opening remarks. The competing demands and expectations of the many publics served by the department had greatly complicated its relationship with those publics, particularly since the passage of NEPA. The result was that unprecedented pressures were and are placed on the expertise of its staff. As with other resource management agencies, life changed drastically for the department and its staff after 1969.

In late 1977 the department was requested to look at the general issue of the adequacy of education and training in the resources management profession. The initial request focused almost exclusively on discovering public and private policies in resources management could be made more coherent using education of the resources manager as the common denominator, out of which could spring some common national goals and provide staff with more rational guidance. Lester Brown of the World Watch Institute, believing that the environmental crisis was at least equal in importance to national defense, proposed a national academy of resources defense that would raise the image, stature, and prestige of resource managers to that enjoyed by graduates of our military academies. Brown's paper was presumably one of the inspirations for the educational explorations that were initiated within the department.

As discussions proceeded and as people outside the department became involved, the focus shifted toward developing theoretical models of institutions that could accomplish several things, including delivery of a new kind of education to resource managers. The feasibility of those models would be tested against predetermined criteria, such as cost, political safeness, and public/private support. A final model would be selected that presumably would be evaluated by various concerned groups. Then, final recommendations would be transmitted to the Secretary of the Interior for action.

It was necessary at the outset of the study to define resource management and to conceptualize the typical manager's roles and functions within an institutional setting, be it public or private. The actual research would then seek for coincidence between what managers actually do and what they are prepared, through their education, to do. Should gaps be identified, the contractor would make recommendations for closing them. These recommendations would be formulated into the aforementioned institutional models and subjected to certain tests of feasibility and the impartial scrutiny of an outside panel of experts representing a cross-section of concern in this field.

The study, which took 16 weeks to complete, identified and examined, by survey, four selected topic areas that had been identified in the study proposal request and validated through subsequent literature searches. The four topics included resources management in the private sector; resources management in the government sector; education, training, and research practices and trends; and current and future job markets.

Results of the surveys were analyzed to form the models for change as described above. Given the time constraints and Office of Management and Budget regulations governing the survey process, almost all information developed in the first two categories was collected by telephone. Each survey took the form of a structured interview lasting from 30 to 90 minutes. Interviews were selected at random from lists provided to the contractor by various government and private sources. A small number of in-person interviews were conducted with Washington area people.

Interviews were designed to elicit data about current job functions, role, and scope of responsibility; preparation, education, and training; years in employed capacity; relationship to management; job purpose; effectiveness of prior education and training; major barriers to job performance; recommendations for graduate and undergraduate education and training programs; and operating environmental ethics in the workplace.

Information about education and training was solicited from selected institutions. Job market data were obtained from a variety of occupational outlook resources.

Over 55 surveys were conducted in the governmental sector, including 18 agencies, Congress, and the White House. Thirty-five people, representing 25 industries or related professional groups, were contacted in the private sector. In addition, 26 members of the academic community and 9 people representing environmental interest groups took part in the survey.

Study Results

The nature of the surveys did not permit quantification of the results. As a check on the contractor's interpretation of primarily subjective information, an advisory committee reviewed the results and made comments on the interpretation.

The outcome was the formulation of two theoretical institutional models. Before reviewing those models, let me acquaint you briefly with some of the important results of the surveys by topic area.

Private Sector

Respondents indicated that although they themselves and/or their employees possessed the basic skills for good management, the institutional factors with which they dealt often constrained the application of those skills. Those constraints or barriers to effective management found in the private sector included:

- Environmental managers in the private sector are faced with a complex political, technical, and administrative milieu that makes it difficult for them to take decisive actions.

  Environmental managers' activities are constrained by governmental requirements and fragmentation, legal considerations, political pressures, unproven management strategies, scientific uncertainty, lack of corporate support, and economic considerations.

  The use of a litigation model for environmental dispute resolution coupled with business' suspicion of environmental objectives encourages lawyers and administrators, rather than technically trained scientists, to develop policies and solutions. The result is that the problem-solving and decision-making authority of most environmental resource managers is highly constrained.

- The lack of shared, comprehensive understanding of the goals of resource management obstructs successful job performance.

  Industry's traditional use of profit indicators to measure employee performance prohibits the development of more appropriate performance indicators for resource managers.

  Resource managers receive little recognition or reward for making positive environmental contributions, and as a result move into other corporate activities to further their careers.

In sum, with the exception of a number of the youngest employees, there is no sense of common purpose that binds business resource managers other than loyalty to the company and loyalty to a particular technical discipline. We did not discover an independent environmental ethic among these people or a sense of collegiality with other professionals working to resolve environmental problems. Indeed, in two instances environmental coordinators had no idea of how similar issues were handled within other divisions of their own companies.

Public Sector

Turning to the public sector, the barriers, in order of priority, included:

- Political and philosophical.
- Bureaucratic, administrative, and time related.
- Personnel management problems.
- Knowledge and education.
- Research and development.

I believe it is significant that in both the public and private sectors, institutional barriers constitute the number one constraint on resource management effectiveness, according to the managers. Furthermore, knowledge and education constraints either did not exist, as in the case of the private sector, or were lower in priority, in the case of the public sector. We, however, could categorize each of the constraints mentioned as educational ones, should we be looking for causitive phenomena.

What is important to note in the study is the overwhelming criticism of the institution, the agency, the bureau. Over 50 percent of all interviewees expressed this. Is this an excuse, a whitewash? Are the managers making the institution whipping boys for when, in reality, we are dealing with a manager's failure? I think not. One has to be in government for but a short period to know that the system more often than not has difficulty accomplishing its business. This personal observation is stated more precisely in a fact sheet prepared by the White House Press Office explaining justifications for the proposed Department of Natural Resources.

"Government institutions have failed to keep pace with this need to make important and complex natural resources policy decisions. These institutions were established one-by-one to meet particular needs. They lack the ability to make the comprehensive natural resource decisions that are now needed" (Office of the White House Press Secretary, 1979).

I cite these perceived institutional failings because they exist and because they detract strongly from the manager's ability to do the job irrespective of training and education.

Educational Constraints

Turning to the educational constraints mentioned by the managers, two issued surfaced. First, the politicization of resource decisions demands managers who possess strong capabilities in people management. Second, effective managers must possess a sound knowledge of systems management methodologies. The study specifically reports:

"Individual resource managers are expected to possess an extremely wide range of skills and knowledge. in order to perform the broad spectrum of duties that resource management entails, resource managers must be managers, planners, problem solvers, politicians, and researchers. The enormous demands on the resource manager's skills and knowledge are compounded by the rapid rate of change that occurs in the field. New legislation and regulations are constantly being created, new scientific discoveries are made, and social and political crises occur - all of which affect the resource manager's job. The very fact that our knowledge of the ecosystem increases rapidly each year will, ironically, always be a constraint on the resource manager because he or she will always lack complete knowledge of the consequences of our interactions with natural systems. The following quote catches the essence of this point eloquently: 'The more we unravel the ecosystem, the more we see the limits of our foundation of knowledge. Actions thought benign are found to have second- and third-level effects never contemplated. This is a critical issue because the whole business of resource management is respectable because it's a righteous activity - trying to live harmoniously with nature and accept some deprivation. These insidious effects crop up to put the resource manager on a very shaky fulcrum. He's hardly the Errol Flynn of the show when he's found to be human and error-prone.'

"Several of the respondents went on to say that it does not matter that this knowledge problem really besets all scientists. What is critical is the time it takes to transfer new knowledge into practice.

"Some made the point that nonscientific knowledge transfer is equally important. Many resource managers come into their job with scientific or technical backgrounds. As they assume positions of greater responsiblity, they need additional skills in personnel management and supervision, finance planning, and other general administrative areas. For instance, weaknesses in written and oral skills were the deficiencies most frequently cited by the federal employees we contacted. These skills are becoming increasingly important as resource managers interact much more frequently with the public. Similarly, several respondents said there is a great need to teach resource managers human resource management as an integral part of their overall curriculum, whether an undergraduate, a graduate, or a continuing education program. One national park superintendent expressed this point, saying it applied to virtually all resource managers, not just park rangers: 'There is a big gap in knowledge of human motivations and interactions in natural resource settings. Ninety percent of a ranger's work is people work, yet ninety percent of their knowledge is in more technical resource management related areas. Few rangers are trained in motivation, attitudes, and behavior, and more research and training needs to be authorized to correct this situation.'"

Lending credence to this observation, Daniel Henning (1974), writing in Interdisciplinary Environmental Approaches, states that resource managers "must recognize that the majority of their problems are basically human ones, and solutions, therefore, are more in the realm of social science than in a particular biological discipline. Decisions are basically concerned with management of people's behavior to natural resources, rather than the natural resources per se." In his remarks is a clear signal to our institutions - one they would do well to heed.

Survey findings based upon interviews with academicians and examination of selected programs reveal that:

- Because of the many different roles that resource managers have to fulfill, there is no one specific ideal academic preparation for jobs in resource management. A number of programs can adequately prepare students for jobs in this field.
- There is no agreement among universities about which areas of studies should be included in the core curriculum of resource management education programs. There is also no consensus on approaches and methodologies for teaching and learning about resource management.
- Universities are searching for new ways to satisfy the national need for better trained people to enter resource management jobs.
- Education and training programs will need to be improved and must respond to future trends.

There are numerous educational and training opportunities available to people who will be entering or who now hold positions in resource managment. The educational content and philosophy of these programs range from highly specialized technical training, such as mining engineering, geology, biology, and chemistry, to broad-based interdisciplinary programs, such as environmental science and natural resource management.

The lack of a consensus as to the ideal academic preparation for resource managers is a reflection of the diverse nature of the roles and responsibilities of resource managers. Some argue that the flexibility of interdisciplinary programs is an asset. Others, however, argue that there is a clear need for more rigid requirements.

Some people distinguish between the role of an undergraduate versus a graduate degree in resource management. Undergraduate degrees, according to some educators, should not be career oriented, but should educate the student in the true sense of liberal arts. Moreover, universities have traditionally taken a dim view of undergraduate courses that primarily teach techniques.

Some people maintain that an ideal academic preparation must provide a sufficient grounding in ethics. They view ethics as an essential part of education because of the important role values play in making decisions about the lives of future generations.

Because of the diffuse and broad nature of environmental resource management, there is controversy as to the subject areas that should be included in a resource management educational program. The general subject areas most frequently mentioned include: values and ethics, ecology, environmental effects, environmental indicators, environmental impact assessment methodology, modeling, monitoring, growth and its implications for the future, economics of the environment, environmental law, administrative processes, and actor/role interactions (Matthews, 1976).

Many educators believe that these subjects will prepare students adequately for careers in resource management and enable them to effectively interact with scientists and technologists, policy makers, and the public. Others feel that an ideal academic preparation must develop the interpersonal/human/public relations skills of resource managers. Moreover, as one study respondent explained: "Resource managers need to learn how to understand and cope with uncertainties and how this can be translated into policy that is not destructive to the economy."

Matthews (1976) observes:

"Perhaps the greatest challenge of professional education in environmental management is to develop the generalizable context among knowledge, cultural, decision, and role categorizations. These must be broad enough to be useful for more than one specific environmental problem. On the other hand, the contexts cannot be so broad that the amount of time and energy required to obtain the needed knowledge and insights would be prohibitive for any given person or that the coverage would necessarily be so superficial that it would be of little practical value to a manager."

Many contend that interdisciplinary training is lost on people who are not firmly grounded in at least one technical area. Faculty and administrators claimed that there are inherent weaknesses in interdisciplinary programs; for example, students do not develop a sufficient depth of understanding in any one area. As one respondent remarked: "The environmental science programs currently offered are 'chop suey.' Students are not learning in depth, nor are they learning how to be circumspect. The programs do not provide the student with sufficient expertise in at least one discipline. In certain instances, students have too much latitude in the choice of courses and independent study."

In other words, academic preparation has become too general, while the trend in resource management has become more dependent upon teams of specialists. This reinforces the need for specialist training. Furthermore, the complexity of resource management issues demands that more technical expertise be developed in a wide range of areas.

Regardless of the approach or the techniques currently used to train resource managers, many people recognize that changes and improvements need to be made for universities to keep pace with the national resource management manpower needs of the 1980s.

Educational Trends

In the future, resource management education will be required to address the following trends:

- The need for a futures perspective.
- The increased importance of citizen participation in the decision-making process.
- The increased controversy over resource management decisions.
- The necessity for a broad approach to problem resolution.

Respondents emphasized the increasing significance that these trends will play in the careers of resource managers. For instance, one professor noted: "The current system does not adequately consider the long-term implications. The time perspective needs to be expanded. Students need a 'futures education' that gives them a sense of the earth's resources and the ethical and moral responsibility to the future."

There is a growing demand for resource managers to learn more economics, modeling, and other quantitative techniques and conflict resolution. Students need to learn how to work in an interdisciplinary framework. One respondent addressed this question with a comment about the fact that not enough students are trained to integrate information and to interact with other disciplines: "There's a need to think about working on an interdependent system. Right now, in interdisciplinary education the parts are episodic. They don't appear connected."

One respondent explained that the system has not encouraged the development of integrative capacities because: "Persons who perform roles within conventional disciplines have not defined roles the way they really exist."

According to several respondents, there is a need to place more emphasis on the role of ethics, vis a vis environmental decisions. Too many programs neglect the human dimension of environmental decisions and ignore the demand that society account for the significance and implications of its actions.

Citizen participation will make the resource manager's job more problematic. Many respondents in government said that there continue to be many more active constituencies that resource managers must respond to. More decisions are being made on a collective and, in many cases, more localized basis. Resource managers need to learn how to listen to and eventually relate to the public. As one respondent said: "There will be a lot of citizen participation that is irritating to managers. We are in a period of citizen activism. Managers will have to listen to the public."

Many respondents also believe that resource management will become more controversial. One respondent asserted: "There will be more controversies. Increasing demands will be placed on diminishing or inaccessible resources. Some major decisions, though, will have to be made at all levels of government."

There will also be demands for greater efficiency, cost effectiveness and practicality. At present, too much time and resources are expended on tasks indirectly or remotely directed to the issues at hand. The proliferation of the bureaucracy in both public and private sectors at the expense of the on-the-ground field force attests to this.

The foregoing is a quick description of the major findings of the Department of the Interior study. Let me sum up the surveys by saying that managers and academia are concerned about preparedness. They are cognizant that things have changed, that new approaches and skills are demanded, and that the entire resource management community must catch up and catch up quickly. The most efficient means for doing this will be in-service or mid-career training. Private and public enterprise must place a very high priority on this activity seeking to retool current management personnel with all due haste.

Accordingly, both institutional models proposed in the study contain a professional development component. Remember that while the impetus for this study was perceived educational needs, one of the two models addresses other needs identified in the surveys and/or in the literature. Professional development then turns out to be but one component in this model.

The components of model number one, which I shall call the institute model, follow:

An Institute Model

Professional Development Support

To explore the core knowledge areas, professional values, and ethics that need to be developed for the field of resource management; to support the development of innovative curricula designs and training programs at all academic levels and career stages; and to provide opportunities for academicians and representatives of industry and government to explore, formally and informally, the trends, opportunities, and needs for trained resource managers.

Policy Analysis and Research

To contribute to the development of regional and national ecological models useful for political decision making; to assist the development of regional planning models; to conduct inquiry into a range of public policy issues not yet comprehensively addressed due to the lack of an effective mechanism; and to assess the national resource and environmental implications of developments that are currently resolved only in terms of local or regional impacts.

National Information Access System

To provide a uniform catalog, access, and referral system to information relevant to making resource management decisions, such as federal reports, research studies, ecological and environmental data, and statistics.

Environmental Planning and Conflict Resolution

To develop, and to support the development elsewhere, of planning, negotiating, and mediating techniques that can resolve environmental conflicts efficiently and optimally and to provide a forum for joint planning among competing interests and for the resolution of conflicts.

In support of these four functions, the institute would also undertake a fifth major activity:

Technical support and Assistance consisting of a limited amount of scientific, economic, and environmental/resource planning assistance to localities, industries, states, and regional groups who wish objective information and technical help in arriving at resource development alternatives that satisfy a broad community of interests. Projects would be undertaken to further the understanding of resource management and environmental principles, provide case study data and other material useful for professional development, and understand the uses and limits of various conflict resolution techniques.

To achieve the level of support and prestige necessary for such an institution to succeed, its development and structure must be carefully planned. The major organizational features that were recommended include:

- Charter - by act of Congress, as a private, nonprofit organization.
- Funding support - federal seed money, plus continual matching grants and special grants, private endowments, corporate donations, and membership dues.
- Board of governors/directors - drawn equally from academia, the business community, environmental groups, and government.
- Staff - a relatively small, permanent core staff supplemented by a fellows program drawing on business, academia, and the scientific and governmental communities. Special groups of associates--academic deans, business and environmental leaders, scientists, and others--to convene for the purpose of providing direction to and work on specific issues such as professional development and training. Regional Associate staff members would work on technical projects carried out locally.

The growth of the institute must be cautiously phased over a suitable period of time. Two functions appear particularly appropriate for initial concentrated effort: professional development support, which serves as a basis for all other functions, and the environmental planning and conflict function.

A Professional Development Model

The second model, which I will call the professional development model, has as its major function the training and career development of in-service resource managers. As envisioned, it would:

- Have an interagency focus.
- Stress collaborative planning and team-building techniques.
- Use actual governmental case studies for analysis.
- Emphasize the strategic aspects of natural resource planning.
- Present and evaluate the latest techniques used to clarify options and quantify trade-offs.
- Permit supervised independent study.
- Examine future trends in the government's role in natural resources management.
- Promote intergovernmental cooperation in resource management, for example, state and local personnel would be admitted to the program.
- Promote international cooperation in resource management.

The program should not, and need not, be grandiose. While this service could eventually offer a range of programs, the cornerstone would be an extended (eight weeks or more) residential program that provides a course of study of sufficient depth to allow for personal growth and the completion of independent study work if desired. The core program content should be targeted to meet the needs of personnel at the threshhold of assuming their first significant managerial post. Personnel at other career stages would not be excluded, however.

The study seems to have concluded that preservice education and training for the resource manager is necessarily vital to the effective functioning of the manager. At the same time it also says that when the actual duties, responsibilities, and functions of the manager are taken into account, an in-service career component will better suit the needs of the manager and prepare him or her for the real world. That this real world is probably less resource managerial and scientific than would be expected is a discovery of this study. That it is juggling public opinion, political expedience, inter-agency territoriality, career opportunity, and regulatory mandates is the real world. No college or university can be expected to deal with these real world facts.

At the same time, colleges and universities do have a responsibility to prepare the graduate for this real world in these suggested ways:

- Examine what you are teaching. Does it make contribution to the operational functioning of the resource manager? The orientation is more often than not toward the environmental assessment. And with this comes a need to have a sense of operational, societal values.
- Examine the focus of the entire program. Is there a realistic focus on the politics of the job?

- Are you inculcating an environmental ethic in which the bottom line is the protection, management, and wise use of ecosystems so that graduates have at least a benchmark? When it comes to critical decisions, does the ecosystem get fair treatment?
- Is your approved methodology and program spirit reflective of an interdisciplinary view of the world, in which human actions and natural systems are in fact a continuum of responses to diverse stimuli?

These questions and thoughts should provide initial guidance for preservice program review. More effective would be to include an operational resource manager from business and industry and from government on your curriculum review committee. They can "tell how it is" and give you more guidance and support than can academia at a time when events are moving rapidly. Ultimately, the goal is to produce a professional cadre of people with special knowledge uniquely suited to manage our natural systems in harmony with our human needs. We are at the threshold of recognizing this. Now we need to put the guidance into practice. A concerted effort among affected parties can accomplish this goal.

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THE OBIS STORY*

Kay Fairwell

Outdoor Biology Instructional Strategies (OBIS), developed primarily for 10-to-15 year olds at Lawrence Hall of Science, University of California at Berkeley, under sponsorship of the National Science Foundation, is designed both for learning more about the environment and for enjoyment. The excerpt below is from an OBIS brochure.

Outdoor Biology Instructional Strategies (OBIS) is a program with a variety of outdoor activities for youngsters to enjoy. While engaged in these activities, youngsters also learn more about the environment in which they live. OBIS activities emphasize interactions of organisms with each other and with their environment. The activities are also concerned with interactions of people with their environment. In the OBIS activities, the learner is an active participant rather than a passive recipient of someone else's information. Games, simulations, craft activities, experiments, and analyses of data are examples of various strategies used.

During Class and After School

These activities are designed primarily for ten-to fifteen-year old youngsters. However, both younger and older participants, including families, enjoy participating in OBIS activities. The activities are suitable for and are being used in outdoor school programs as well as by community groups.

OBIS folios have an easy-to-follow format and are written for the teacher or leader. An OBIS leader is usually a teacher, Girl Scout leader, den mother, scoutmaster, camp counselor, volunteer, parent, student, or almost anyone who enjoys working with children.

Choose a Site

OBIS activities can be used wherever you happen to find yourself: lawns, parks, school yards, backyards, street parkways, vacant lots, streams, rocky or sandy beaches. Some of the activities apply to any type of site, while others are designed for specific sites. Areas that support heavy human use are actually preferred to untouched, pristine environments.

Excerpted from The OBIS Story, edited by Kay Fairwell. Berkeley, CA: University of California, Lawrence Hall of Science, 1979. (ED 174 363).

Pick Your Time

When can you do OBIS activities? Some are suitable for night or day, rain or shine, winter or summer. Do them on a one-time basis, once a month, once a week, or every day for a week or two.

Learning Through Participation

Why OBIS? OBIS wants to stimulate curiosity in the youngsters about life and the world around them. In order for youngsters to become aware of the environment in which they live, they need to participate in some thought-provoking activities. OBIS does not believe that children of this age group are satisfied with the "sniff and appreciate" approach to ecological understanding. Instead, OBIS encourages youngsters to investigate the interrelationships of plants, animals, and physical environment, including the role of humans in the natural scheme. Youngsters not only develop observational skills that they can continue to use throughout their lives, but also gain some understanding about their environment.

In order for people to make intelligent decisions about their future environment, they must have knowledge of the one in which they live. Firsthand experience in the outdoors forms a basis for the understanding of biological relationships. This understanding is necessary to raise the public consciousness required to support appropriate management of the environment.

The "How to..." of OBIS

How can you lead an OBIS activity? The optimum size for a group is one leader and about twelve participants, but teachers who have good rapport with their students can easily work with a larger group. OBIS activities are easy to lead, easy to prepare, and require mostly simple or homemade equipment. No previous experience is necessary! A biological information necessary to learn an activity is presented in the folio.

Each activity may be done independently, in a sequence, or as a lead-in to or culmination of other activities. Leaders decide how or whether they will sequence the activities. Most activities take a little less than an hour, but many are open-ended.

How OBIS Activities are Developed

How are these activities developed? Unlike many development projects, OBIS considers the testing of activities with youngsters to be a vital fator in the development of activities. The development process is one of devising a strategy, trying it out numerous times with youngsters, and making the necessary modifications. If the activity doesn't work with kids, it is not printed for trial use by other groups.

The Biology of OBIS

Most of you have probably experienced the thrill of lifting up a log or an old board and discovering the myriad of organisms living underneath. Spiders, worms, sow-bugs, crickets, salamanders, and fungi are some of the organisms that often form under-the-log communities. How are these organisms able to survive in this environment? What structural or behavioral adaptations enable them to exist under these special conditions? And what might this community under the log have to do with us? These are the kinds of biology questions you will find in OBIS activities. Along with such questions, OBIS provides investigative tools for the youngsters to use in finding possible answers.

The OBIS challenge is to help children understand some of the interactions between animals, plants, and the nonliving environment. To meet this challenge, OBIS uses the outdoor site as the laboratory in which youngsters have the opportunity to learn. We believe that youngsters gain more understanding by investigating biological events where they naturally occur - in the outdoors.

Where Do We Fit In?

Our life on this earth is dependent on the life of other organisms. Directly or indirectly, other organisms provide us with food, clothing, and shelter. We eat other organisms and their products. Animal fur or hide and plant fibers are used for clothing. We convert plants into construction materials. In short, other organisms are essential to our daily life. In turn, our activities both directly and indirectly influence other organisms, whether they are the bacteria and micro-organisms in the soil, the algae and fish in our streams, or the trees in our forests.

OBIS brings these interrelationships home to the youngsters. In the OBIS activities Plant Patterns, Animal Diversity, Junk-in-the-Box, and Can Fishing, the youngsters look closely at the human influence in the distribution and kinds of organisms present in an area. In OBIS Oil Spill youngsters simulate effects of an offshore oil spill on plants, animals, and the human recreation potential of an area. The OBIS Trail Module explores both the impact of a foot trial on a hillside area and the effect the steepness of the trail has on the people who use it. Youngsters directly interact with their environment in each OBIS activity. An important aspect of every OBIS experience is the opportunity for the youngsters to notice their own impact on the activity area.

Taking the Simple Approach

OBIS activities are designed primarily for use in man-managed environments. These are the most common environments and are the ones with which the youngsters are most familiar. They can actively investigate such areas without causing irreparable damage to an environment. OBIS uses inexpensive or homemade equipment, which enables more leaders to use the materials, and more children to be exposed to outdoor biology. OBIS activity leaders usually have a limited background in outdoor biology. The leader's own sense of discovery in participating in the activity often enriches the youngsters' investigative enthusiasm.

OBIS activities, for the most part, are written to stand on their own. Thus it is not necessary to follow a rigid sequence of activities in order for the participants to understand a particular concept. Children can learn and understand a biological principle in just one activity - or they can do a series of activities for more extensive understanding. The leader has the choice.

Simplifying Complexity

Biology can be fascinating yet elegantly simple. Direct experiences, simulations, games, and creative art experiences are all part of OBIS strategies. Using diluted food coloring, children learn about animal respiration by actively searching for inlets and outlets of water breathers. True, the youngsters do not learn about complex reflexes of breathing. But, more importantly, they see food coloring emerging in squirts and steady streams, from "different places" than they expected: from the left sides of tadpoles, from the fronts of crayfish, and at different rates according to the animal or the temperature. The biology of OBIS is a mixture of obvious and subtle experiences with local organisms and their great diversity of adaptations, both structural and behavioral. Adaptations result in survival and reproduction: the name of the game for all populations. In emphasizing both plant and animal adaptations that can be seen, touched, heard, or smelled by the youngsters, OBIS approaches the youngsters at their level. Once introduced at the youngsters' level, each principle may be enlarged upon by the leader and the children as far as their experiences will permit.

The OBIS approach is concrete because we found it had to be so. If the youngsters can't understand what they are doing, what value is there in proceeding?

The theme of OBIS revolves around ecosystems. Natural selection, successional changes, periodic changes in life forms, food chains and webs, species dominance and density, behavior of organisms, interactions of organisms with their environment, and population structure are the biological topics that we weave into the activities. The ecological theme provides the flexibility to help children of different ages, capabilities, interests, and backgrounds to learn biology in the outdoor settings where interactions take place.

STATUS OF ENVIRONMENTAL EDUCATION IN TENNESSEE*

Richard K. Fletcher Jr., Jack Rhoton, and John K. Bennett

Before steps are taken to improve existing situations, it is sensible to describe current status; a truism, to be sure, but one often honored in the breach. In this case, however, a cooperative effort among Tennessee Technological University at Cookeville, Kingsport City Schools, and the Tennessee Department of Education produced a survey of pre-college educators from across the state "to determine how Tennessee educators feel about the importance of environmental education and their determination in implementing it," for the purpose of providing information to those responsible for providing training opportunities in environmental education.

Introduction

Man's concern with his environment is nothing new. As early as 1891, Wilbur Jackman's Nature Study for the Common School launched a nature study movement which took students outdoors to explore an indivisible environment with an integrated approach. Not long after Jackman's start, President Theodore Roosevelt sparked a trend that led to the reverse of wastefulness that had been prevalent for the past 300 years. Soon to follow was Aldo Leopold with his thought provoking ideas. Rachel Carson's The Silent Spring awakened many a sleeping mind. Still many people fail to realize that the most important discovery of the twentieth century is not the discovery of the atom, not the advent of the transistor but the realization that all living things are interdependent. As the world becomes more crowded and complex these interdependents become more important.

Where does the responsibility for environmental decisions rest? It rests with each individual. Each individual must be equipped to perceive and then to evaluate each set of environmental circumstances as a new challenge. Each individual must become aware of the interrelationship and interdependency that exists between the biological and physical aspects of the environment. He must realize that alternatives do exist within our environment and be equipped to choose the most logical alternative. He must also be able to provide leadership to those who are unaware of the environmental problems that exist. It is the educational community's responsiblity to see that he is able to meet these environmental concerns.

Since environmental education touches every aspect of living and learning, an environmental education program must not be approached as a separate subject, but diffused into curriculum. An environmental education

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Presented at the 1979 annual convention of the National Science Teachers Association in Atlanta, GA; support for the study was provided by the Faculty Research Fund at Tennessee Technological University. (ED 195 415).

program must provide the learner with meaningful, realistic experiences so that he will be able to identify his role in the ecosystem. This identification must become an automatic and self-committed process.

Whose responsibility is it to first awaken each individual? It is the responsibility of the educator. Their support of environmental measures should be based not only on national, social, political and economic reasons, but moral sense of waste and a need for stewardship.

This study was an attempt to determine how educators across Tennessee feel about the importance of environmental education and their determination in implementing it. The following presentation indicates the reflections of 1035 pre-college educators from throughout Tennessee. Hopefully these results will serve as information to institutions, organizations and agencies for providing additional training opportunities in environmental education. That was one of the major purposes for the investigation.

Research Method and Procedure

The population for this study was the professional staff of teachers, elementary principals, and supervisors of instruction in the State of Tennessee. A sample was chosen from the Directory of Public Schools for the State of Tennessee which included 271 elementary principals, 946 science teachers middle grades through high school, and 218 supervisors of instruction. Each of the 271 elementary principals was mailed a questionnaire and postage paid preaddressed envelope for himself and two teachers; one from grades K-3 and the other 4-6. Each of the 946 science teachers was given an additional questionnaire and envelope and asked to disseminate it to a social studies teacher in the same school. Returns were received from 1035 of the 2923 possible, a 35.41 percent reply. The count per subgroup was as follows: elementary teachers k-3 - 144; elementary teachers 4-6 - 127; middle or junior high school science teachers - 172; midde or junior high school teachers of social studies - 94; senior high school teachers of science 9-12 - 170; senior high school teachers of social studies 9-12 - 54; elementary principals - 136; supervisors of instruction - 92; and other or no identification - 46.

The data were analyzed at the D.W. Mattson Computer Center at Tennessee Technological University. Frequency tabulations and percentages were calculated for all of the 50 items on the questionnaire. Means were computed for items 9 through 40. The analysis of variance procedure was utilized in testing null hypotheses for all comparisons between subgroups.

Presentation of Findings

To the question, "Do you believe environmental related problems indicate a need for teaching environmental education in public education?", 93.9 percent responded yes. The respondents to the questionnaire indicated that only 31.2 percent of them had studied environmental education in a college setting while 35.1 percent indicated they had participated in workshops or inservice programs related to environmental education. Of those who had participated in workshops or inservice programs it was determined that 15.3 percent had received support from the National Science Foundation and another 4.0 percent had received support from a grant from Health, Education, and Welfare. Another 25.6 percent indicated they received support from other sources. Fifty-five percent of the group indicated they received no financial support. Thus, a total of 45 percent of those who attended workshops and inservice training had received financial assistance from some source. Yet, over 60 percent of the total group indicated no training whatever in environmental education.

When asked the question, "Which pattern of environmental education best describes that used in your school?", 6.1 percent indicated a separate course was taught; 59.2 percent indicated that environmental education was integrated into other subjects; 28.1 percent indicated that incidental instruction was provided; and 6.5 percent indicated that it was not taught. The respondents overwhelmingly indicated that the State Department of Education should strongly encourage the development of environmental education programs in the schools with an 85.4 percent agreement with the item.

When asked the types of environmental activities being employed in their school, 61.9 percent of the respondents indicated they were using field trips; 54.5 percent indicated the use of outdoor programs on school sites; 7.6 percent were utilizing Tremont, 10.0 percent indicated they were utilizing Land-Between-The-Lakes, 14.2 percent indicated they were utilizing another residence program, and 68.2 percent indicated they were not utilizing residence programs. Only 8.6 percent of the group indicated their school was not using films on environmental education with over 20 percent indicating they used ten or more films per year; and over 70 percent of the respondents indicated they were utilizing resource persons in environmental education.

Over 70 percent of the sample who responded to the questionnaire indicated they thought environmental education programs should focus on the pre-adult level. Only 1.6 percent of the group indicated that the primary focus should be at the adult level while another 26.2 percent indicated that it should be emphasized at all levels, K-adult. The largest single response of 31.3 percent indicated that the primary focus for environmental education should be at the middle or junior high school level.

There was a very positive response to items relating to further study and involvement with environmental education. Over 50 percent of the group indicated they would like further information relating to a residence center operation; 53.2 percent of the group indicated they were interested in participating in a workshop or inservice opportunity in environmental education; 35.8 percent said they were not aware of the Tennessee Environmental Education Association (TEEA) but were interested in it; and another 20.3 percent indicated an awareness of the TEEA while only 1.6 percent indicated membership in it. The results indicate that there are a large number of school personnel who have an interest in environmental programs and organizations.

One of the main parts of the questionnaire dealt with difficulties associated with teaching environmental education. The respondents were asked to rate the levels of importance to the several problem areas facing implementation of environmental education programs. Table I includes the ranking from highest area of difficulty to lowest (based upon a scale of 5 = highest and 1 = lowest). As noted in Table I the areas of most concern relate to preparation of teachers in environmental education and inadequate inservice training opportunities in environmental education. There respondents also believe there is a lack of appropriate curriculum material on environmental education. Problems associated with legal concerns and the back to basics issues were also noted as important areas of difficulty.

TABLE I

MEAN RANKING OF PROBLEM AREAS RELATING TO THE TEACHING OF ENVIRONMENTAL EDUCATION

Rank	Problem Area	Mean Ranking
1	Preparation of teachers in environmental studies	3.75
2	Inadequate inservice training in environmental education	3.69
3	Lack of appropriate curriculum materials	3.63
4	Potential legal problems associated with transporting and supervising students in out-of-school areas	3.60
5	Present day stress on back to the basics and competency testing	3.50
6	Rigidity of the school schedule	3.36
7	Lack of support from state and other governmental agencies	3.33
8	Insufficient room in our present school curriculum	3.16
9	Confinement of students in the classroom	3.04
10	Lack of acceptance by the general public	2.88
11	Lack of acceptance by teachers	2.82
12	Insufficient student interest	2.63

Interestingly, the area of least importance as a difficulty associated with implementing environmental education was insufficient student interest.

The question of what subject area is of most importance in regard to the teaching of environmental education constituted another major portion of the investigation. The respondents ranked the several discipline areas on a scale ranging from 5 (very important) to 1 (not important) on the question of which should receive the greatest emphasis in environmental education. The results of the analysis depicted in Table II indicate that the science areas, especially the earth sciences and biological sciences, are considered as most important for environmental education. The physical sciences and health were also ranked highly on the scale. Though much emphasis has been placed on the need to integrate environmental education into all areas of the curriculum, the ranking for a new course in environmental education was fifth with a mean of 3.91 on the five point scale. Vocational home economics and agriculture and geography were also indicated as important areas of emphasis for environmental education.

TABLE II

RANKING OF EMPHASIS ON ENVIRONMENTAL EDUCATION BY DISCIPLINE AREA

Rank	Discipline Area	Mean Ranking
1	Earth Sciences	4.48
2	Biological Sciences	4.36
3	Physical Sciences	4.14
4	Health	4.13
5	A New Course in Environmental Education	3.91
6	Vocational Home Economics and Agriculture	3.89
7	Geography	3.77
8	Sociology	3.51
9	Economics	3.49
10	Vocational Industrial Areas	3.47
11	Civics, Government, Political Science	3.41
12	History	3.02
13	Special Education	2.86
14	Physical Education	2.81
15	Art	2.71
16	Mathematics	2.68
17	Language Arts	2.67
18	Business Education	2.59
19	Literature	2.57
20	Music	2.23

Moderate rankings were given for a number of other areas such as the social sciences and industrial arts with low rankings given to the humanities, mathematics, business education, physical education and special education.

Summary and Conclusions

Educators in the State of Tennessee perceive environmental education as an important component of the curriculum. They still view it as being most associated with the integration of environmental education into the curriculum. Some of these relate to teacher training and curriculum development while many related to such areas of concern as legal problems and back to the basics. In general, educators in Tennessee want more opportunities for involvement in environmental education and are interested in participating in workshops or inservice programs relating to it.

Some of the problems associated with dispensing the questionnaire resulted in a low return of response. It can not be determined what the effect of mailing out the questionnaires in bulk rate format had on the percentage of returns. Also, it may be possible that those who returned the questionnaire were more interested in the area of environmental education than those who did not. The results from this study must be limited to the 1035 educators who responded to the questionnaire. The 35 percent return is insufficient to draw inference to the total population of educators in Tennessee. Also, another limitation should be considered when interpreting results on ratings in the areas of the secondary curriculum other than science and social science - there was no representation from the other areas since the sample was not selected from all areas of the curriculum. It is recommended that similar studies be completed in other states with better sample selection in the secondary curriculum areas. Though there are definite limitations to this study, it indicates considerable interest in environmental education in Tennessee.

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TABLE III

ANALYSIS OF VARIANCE RESULTS ON COMPARISON BY TEACHING POSITION

		Subgroup Means												
Item	N of Cases	Elem. Tchr. K-3	Elem. Tchr. 4-6	Jr. High Science	Jr. High S.S.	Sr. High Science	Sr. High S.S.	Elem. Prin.	Supv. Instr.	Other	F-Ratio	DF B	DF W	Sign. Level
Insufficient room in our present school curriculum	985	3.41	3.35	2.99	3.10	2.75	3.02	3.27	3.46	3.45	4.70	8	976	.000
Preparation of teachers in environmental studies	991	3.72	3.78	3.79	3.62	3.46	3.80	3.78	4.05	3.93	2.88	8	982	.004
Lack of appropriate curriculum materials	987	3.81	3.60	3.60	3.73	3.47	3.68	3.52	3.72	3.83	1.39	8	978	.199
Confinement of students in the classroom	977	2.78	3.15	3.30	3.03	3.15	3.25	2.91	2.74	3.20	3.13	8	968	.002
Lack of acceptance by teachers	987	2.99	2.82	2.71	2.69	2.66	2.83	2.82	2.99	5.38	2.48	8	978	.012
Lack of acceptance by general public	983	2.89	2.95	2.79	2.93	2.80	3.09	2.80	2.84	3.17	.91	8	974	.504
Lack of support from State & Governmental Agencies	976	3.12	3.27	3.36	3.31	3.28	3.62	3.42	3.41	3.68	1.77	8	967	.080
Rigidity of the school schedule	986	3.23	3.22	3.54	3.40	3.47	3.49	3.12	3.32	3.82	2.25	8	977	.022
Insufficient student interest	986	2.69	2.27	2.63	2.59	2.82	2.92	2.39	2.65	3.17	4.44	8	977	.00
Back to Basics & Competencey Testing	987	3.64	3.64	3.35	3.34	3.15	3.56	3.53	3.93	3.55	3.75	8	978	.00
Inadequate Inservice Training in Environmental Educ.	990	3.87	3.53	3.72	3.62	3.64	3.77	3.67	3.70	3.89	1.02	8	981	.417
Potential legal problems in transport	983	3.75	3.58	3.68	3.58	3.77	3.54	3.16	3.53	3.82	2.77	8	974	.005
Art	904	2.94	2.95	2.53	2.64	2.44	2.56	2.85	2.55	2.71	3.49	8	895	.001
Music	894	2.62	2.58	2.03	2.08	1.86	1.93	2.44	2.11	2.25	8.31	8	895	.000
Health	946	4.09	4.06	4.26	4.04	4.14	4.13	4.06	4.10	4.10	.65	8	937	.738
Biology Sciences	958	4.20	4.19	4.56	4.20	4.66	4.36	4.18	4.29	4.41	6.08	8	949	.000
Physical Sciences	946	3.97	4.00	4.12	3.92	4.28	4.42	4.28	4.04	4.32	2.83	8	937	.004
Earth Sciences	975	4.30	4.45	4.52	4.31	4.58	4.73	4.47	4.51	4.44	2.27	8	966	.021
Mathematics	911	2.74	3.07	2.56	2.67	2.46	2.04	2.70	2.65	3.00	3.92	8	902	.000
Vocational Industrial Areas	904	3.55	3.32	3.40	3.24	3.67	3.46	3.40	3.48	3.71	1.55	8	895	.135
Vocational Home Economics & Agriculture	922	3.87	3.72	3.94	3.85	4.07	3.86	3.73	3.90	4.17	1.70	8	913	.095
Sociology	917	3.45	3.41	3.46	3.67	3.66	4.06	3.33	3.42	3.35	2.90	8	908	.004
Language Arts	904	2.96	2.94	2.55	2.67	2.29	2.29	2.76	2.66	2.82	4.62	8	895	.000
Literature	895	2.71	2.70	2.48	2.57	2.38	2.45	2.59	2.39	2.71	1.57	8	886	.130
A new course in environmental education	931	3.90	3.80	4.10	3.89	4.24	4.06	3.56	3.40	4.03	4.61	8	922	.000
Business Education	891	2.62	2.60	2.53	2.67	2.60	2.66	2.37	2.53	2.89	.89	8	882	.534
History	916	2.96	3.02	2.97	3.21	2.90	3.46	2.99	2.82	3.37	2.46	8	907	.012
Civics, Government, Political Science	923	3.24	2.60	3.29	3.65	3.52	3.92	3.35	3.30	3.71	3.17	8	914	.002
Geography	935	3.65	3.87	3.61	3.93	3.76	4.37	3.77	3.61	3.68	3.54	8	926	.001
Economics	921	3.35	3.39	3.35	3.29	3.67	3.87	3.53	3.50	3.53	2.17	8	912	.028
Physical Education	903	2.97	2.79	2.83	2.84	2.66	2.55	2.89	2.58	2.89	1.25	8	894	.268
Special Education	892	2.84	2.95	2.78	2.93	2.87	2.89	2.89	2.72	2.82	.332	8	883	.953

MAKING WATER POLLUTION A PROBLEM IN THE CLASSROOM THROUGH COMPUTER-ASSISTED INSTRUCTION*

John D. Flowers

Computer-assisted instruction provides students and teachers with alternative means for dealing with many topics worth studying. The paper below, written at the School of Education at Augusta College, Georgia, describes one computer-oriented program in terms of teaching wastewater treatment and pollution concepts to middle school and secondary school students.

Water pollution is not a problem. A problem is any question proposed for solutions. Granted, water pollution may initiate many questions proposed for solutions; however, in and of itself water pollution is neither a question nor is it a well formulated statement of a problem.

Water pollution, in point of fact, is a phenomenon. It belongs in the same category as any fact or event of scientific interest susceptible of scientific description and explanation. It is a phenomenon in the sense that it is a scientifically describable event or process. For example, water from a polluted river can be touched, sampled, measured, and sometimes smelled. It can be analyzed and described in terms of chemical composition and effects on living organisms.

The phenomenon of water pollution becomes a problem when students and teachers begin raising questions and addressing situations concerning its impact on living organisms. Herein lies one of our greatest challenges as teachers of life sciences; namely, to implant within our students the skills of asking questions amenable to the problem solving approach common to all scientific research. Implicit in this challenge is the assumption that students should not only be able to react to questions asked by their teachers, but they should be able to proact or initiate the kinds of questions that lead to meaningful problem solving tasks.

Middle school and high school students are able and eager to ask questions concerning water pollution. However, the kinds of questions they usually ask require knowledge-type answers consisting of a name, or place, or date. Middle school students have great difficulty asking questions and analyzing situations which relate two or more abstract concepts or variables. For example, a sixth grade student could ask, "Does our town have a plant for waste water treatment?" This question requires a simple knowledge-type answer devoid of true problem solving and abstract reasoning. That is to

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Presented at the 1980 annual convention of the National Association of Biology Teachers in Boston, MA. (ED 196 702).

say, the question does not lend itself well to the formulation of hypotheses, collection of data, and testing hypotheses. Although questions requiring recall of specific facts are important, good middle school teachers want their students to be able to use knowledge to solve problems; not to simply parrot back previously learned scientific facts. Middle school students should be given many opportunities to develop their newly emerging ability to solve problems by using abstract rather then concrete referents.

High school biology students should be given opportunities to further develop and refine higher order thinking. It is necessary that both middle and high school students acquire a large quantity of factual information regarding ecology related problems including water pollution; however, acquisition of a body of factual information should not be a goal in and of itself.

Developing Problem Solving Skills Via POLUT

One generally recognized way to insure that students acquire and use newly acquired knowledge about water pollution and other ecology related subjects is to present them with situations that require solutions. One generally unrecognized means to this end is the use of computer simulation programs available through most universities and large colleges.

A particularly appropriate computer simulation program focusing on water pollution is produced by Digital Equipment Corporation. Program POLUT provides repeated opportunities for students to proact with their environment through simulation. For example, students can investigate the effects of a number of variables on dissolved oxygen in water. They can state problems and test hypotheses within a fraction of the time normally required. The likelihood of asking problem solving type questions is thereby greatly enhanced by providing students with the means to test their hypotheses at a computer terminal in a relatively short period of time.

Many problem solving activities in the classroom often take days or weeks before results can be recorded and hypotheses tested. POLUT, on the other hand, provides students with immediate feedback on many possible hypotheses which are quickly tested by the computer. Immediate feedback appears to stimulate students to ask additional thoughtful questions and state alternative hypotheses.

Using POLUT in the Classroom

POLUT allows students to "see" consequences of certain actions taken to control water pollution. Both graphic and tabular results of manipulated variables are printed on paper or a television monitor in a matter of a few seconds. The display of data and its comparison can be used to formulate additional hypotheses or predictions. Figure 1 outlines the variables and simple instructions for using POLUT.

Interaction with POLUT

Computer: Do you need instructions (YES = 1, NO = 0)?

Student: (Type "1" to receive instructions.)

Computer: In this study you can specify the following:

A. Body of water
    1. Large pond
    2. Large lake
    3. Slow-moving river
    4. Fast-moving river
B. Water temperature (Fahrenheit)
C. Kind of waste dumped into body of water
    1. Industrial
    2. Sewage
D. Rate of dumping (ppm/day)
E. Type of waste water treatment
    0. None
    1. Primary (sedimentation or screen filtered)
    2. Secondary (sand filter or activated sludge method)

Computer: Body of waste?

Student: (Type any number given by the computer.)

Computer: Kind of waste?

Student: (Type a number between "0" and "14" ppm/day.)

Computer: Type of treatment

Student: (Type either "0" for NO TREATMENT, "1" for PRIMARY TREATMENT, or "2" for SECONDARY TREATMENT.)

Computer: Do you want: a graph (1), a table (2), or both (3)?

Student: (Type "3" to get printout of both graph and table.)

Computer: (At this point the computer prints a table and graph.)

Computer: Another run (1 = YES, 0 = NO)?

Student: (Student may begin another run of POLUT by typing "1" for YES. The computer then asks for the same information as before.)

Figure 1

Given the simplicity of working with the POLUT program, one can easily imagine the nature of questions students are motivated to ask. An example of a question students are likely to ask when allowed to manipulate program variables is, "When will water pollution kill fish?" The simple asnwer is that game fish begin to die when dissolved oxygen goes below 5 ppm. However, when working with POLUT, the student must initiate the selection of variable values which contribute to the diminution of dissolved oxygen. Thus, the student becomes aware of the interaction among two or more variables that directly affects pollution of a given body of water.

When using POLUT the student will learn that it is necessary to hold all but one variable constant in order to make valid judgments. Figures 2 and 3 illustrate these points by comparing graphs which reflect manipulation of a single variable. In Figures 2 and 3 the following variables and values are selected to remain constant:

Variable		Value
Body of water	=	Slow-moving river
Water temperature	=	65 degrees F.
Kind of waste	=	Industrial
Type of treatment	=	Primary

The manipulated variable is DUMPING RATE. Figure 2-A indicates a DUMPING RATE of 11 ppm. It can also be noted that game fish begin to die after day 7 because the oxygen content of the water dropped below 5 ppm. Students can see that Figure 2-B represents a small improvement in that the fish begin dying after day 9 when the DUMPING RATE is reduced by 1 ppm. Although oxygen content is dangerously close to the 5 ppm level as indicated in Figure 3-A, students can see that a reduction of the DUMPING RATE from 10 to 9 ppm results in conditions satisfactory to support game fish. A further reduction of the DUMPING RATE from 9 to 7 ppm results in a significant reduction of waste as well as a significant increase in dissolved oxygen. A student could thus predict the point at which the DUMPING RATE for a slow-moving river would result in dangerous pollution; other variables held constant.

Another question students are likely to ask when using POLUT is, "How does the type of waste water treatment affect fish life?" At this point the teacher can ask each student or team of students to write one or more hypotheses they would like to test. If students have already studied the operation of primary and secondary treatment plants they may offer an hypothesis similar to the following: "Dissolved oxygen in water is greater when secondary treatment is used." In order to test this hypothesis, students would simply hold all variable values constant except for TYPE OF TREATMENT.

Dissolved Oxygen In Water

```
       0...OXYGEN-SCALE....5...OXYGEN-SCALE...1
       0..WASTE.10..SCALE.20..WASTE.30..SCALE.4
DAY    I---------I---------I---------I---------
 0    I   W                            O
 1    I        W                     O
 2    I           W                O
 3    I              W           O
 4    I                 W      O
 5    I                  W   O
 6    I                    WO
 7    I                    OW
 8    I                    O W
 9    I                   O  W
10    I                   O   W
11    I                  O    W
12    I                  O     W
13    I                  O     W
14    I                  O     W
15    I                  O     W
```

A - Dumping Rate = 11 ppm

```
       0...OXYGEN-SCALE....5...OXYGEN-SCALE...1
       0..WASTE.10..SCALE.20..WASTE.30..SCALE.4
DAY    I---------I---------I---------I---------
 0    I   W                            O
 1    I       W                       O
 2    I           W                O
 3    I             W            O
 4    I               W        O
 5    I                 W     O
 6    I                  W   O
 7    I                   W O
 8    I                    WO
 9    I                    OW
10    I                    OW
11    I                    OW
12    I                   O  W
13    I                   O  W
14    I                   O  W
15    I                   O  W
```

B - Dumping Rate = 10 ppm

Figure 2

TABLE 1

Data Corresponding to Figure 2-A

Time Days	Oxy.Content PPM	Waste Content PPM
0	8	2.67
1	7.6	7.59
2	6.96	11.41
3	6.39	14.37
4	5.93	16.68
5	5.57	18.46
6	5.3	19.85
7	5.08	20.93
8	4.91	21.76
9	4.78	22.41
10	4.68	22.92
11	4.6	23.21
12	4.54	23.61
13	4.5	23.85
14	4.46	24.03
15	4.43	24.17

TABLE 2

Data Corresponding to Figure 2-B

Time Days	Oxy.Content PPM	Waste Content PPM
0	8	2.67
1	7.64	7.14
2	7.05	10.61
3	6.53	13.31
4	6.12	15.4
5	5.79	17.03
6	5.54	18.29
7	5.35	19.27
8	5.19	20.03
9	5.08	20.62
10	4.98	21.08
11	4.91	21.43
12	4.86	21.71
13	4.82	21.92
14	4.78	22.09
15	4.76	22.22

Dissolved Oxygen in Water

```
       0...OXYGEN-SCALE....5...OXYGEN-SCALE...10
       0..WASTE.10..SCALE.20..WASTE.30..SCALE.40
DAY    I---------I---------I---------I---------I
 0    I   W                            O
 1    I       W                       O
 2    I          W                  O
 3    I            W              O
 4    I              W          O
 5    I                W       O
 6    I                 W     O
 7    I                  W   O
 8    I                  W   O
 9    I                   W O
 10   I                   W O
 11   I                    WO
 12   I                    WO
 13   I                    WO
 14   I                    WO
 15   I                    WO
```

A - Dumping Rate = 9 ppm

```
       0...OXYGEN-SCALE....5...OXYGEN-SCALE...10
       0..WASTE.10..SCALE.20..WASTE.30..SCALE.40
DAY    I---------I---------I---------I---------I
 0    I   W                            O
 1    I      W                        O
 2    I        W                    O
 3    I          W                 O
 4    I            W              O
 5    I             W            O
 6    I              W          O
 7    I              W          O
 8    I               W        O
 9    I               W        O
 10   I                W       O
 11   I                W      O
 12   I                W      O
 13   I                W      O
 14   I                W      O
 15   I                W      O
```

B - Dumping Rate = 7 ppm

Figure 3

TABLE 3

Data Corresponding to Figure 3-A

Time Days	Oxy.Content PPM	Waste Content PPM
0	8	2.67
1	7.68	6.69
2	7.15	9.82
3	6.68	12.24
4	6.31	14.13
5	6.01	15.59
6	5.79	16.73
7	5.61	17.61
8	5.47	18.29
9	5.37	18.82
10	5.29	19.24
11	5.22	19.56
12	5.17	19.8
13	5.13	20
14	5.1	20.15
15	5.08	20.26

TABLE 4

Data Corresponding to Figure 3-B

Time Days	Oxy.Content PPM	Waste Content PPM
0	8	2.67
1	7.75	5.8
2	7.34	8.23
3	6.97	10.12
4	6.68	11.58
5	6.46	12.72
6	6.28	13.6
7	6.14	14.29
8	6.04	14.82
9	5.95	15.23
10	5.89	15.55
11	5.84	15.8
12	5.8	16
13	5.77	16.15
14	5.75	16.26
15	5.73	16.35

Assume that a student refers to data previously generated such as that in Table 1 or Figure 2-A. Further assume that the student enters the same variable values except for TYPE OF TREATMENT. For the manipulated variable, the student types a "2" which tells the computer that the type of treatment will be secondary instead of primary. The student receives data from the computer and compares them to previously collected data. Table 5 indicates the contrast between oxygen content as a function of the type of treatment used. Thus, the hypothesis stating that dissolved oxygen is greater when secondary treatment is used cannot be rejected. The graphs in Figure 4 emphasize the stark difference between type of treatment variables and help the student to "see" the advantage of using secondary treatment of waste water.

Getting POLUT in the Classroom

There are at least three options open to teachers who would like to make POLUT available to their students:

1. Allow students to use in-house terminal(s) if POLUT can be handled by existing hardware.

For those teachers who are in a school that has micro-computers or larger computers with paper tape read-in capabilities, it is possible to program the computer. When the paper tape is read by the computer it is automatically stored in the computer's memory and is available for use.

2. Take students on a campus where POLUT and computer terminals can be found.

Teachers who are near a university should contact the university's division of computer services. Permission may be given to take a small group of students on campus where they can gain acess to computer terminals for a limited period of time. Given sufficient instructions regarding the nature of POLUT, and given opportunity to write two or three hypotheses to be tested before the visit, students would need no more than 15 to 20 minutes of computer terminal time.

3. Teacher collects data which are returned to students for purposes of testing hypotheses.

It may be most feasible for teachers to access POLUT on a university or in-house computer and enter variable values previously suggested by students. For example, a class of thirty students could be divided into 5 teams of 6 students each. Each team would discuss the variables in context of their knowledge of water pollution. One way to get realistic variable values would be to arrange for students to visit a waste water treatment plant. After ascertaining the values for POLUT variables one group of students may decide to test the hypothesis that the present values result in a level of pollution that endangers fish life in a nearby river.

Types of Treatments

```
      0...OXYGEN-SCALE....5...OXYGEN-SCALE...1
      0..WASTE.10..SCALE.20..WASTE.30..SCALE.4
DAY   I---------I---------I---------I--------
  0   I  W                            O
  1   I       W                     O
  2   I          W                O
  3   I             W           O
  4   I                W      O
  5   I                 W   O
  6   I                   WO
  7   I                   OW
  8   I                   O W
  9   I                  O  W
 10   I                  O   W
 11   I                 O    W
 12   I                 O     W
 13   I                 O     W
```

A - Primary Treatment

```
      0...OXYGEN-SCALE....5...OXYGEN-SCALE...1
      0..WASTE.10..SCALE.20..WASTE.30..SCALE.4
DAY   I---------I---------I---------I---------I
  0   I  W                            O
  1   I   W                           O
  2   I   W                          O
  3   I    W                         O
  4   I    W                        O
  5   I     W                       O
  6   I     W                       O
  7   I     W                       O
  8   I     W                       O
  9   I      W                     O
 10   I      W                     O
 11   I      W                     O
 12   I      W                     O
 13   I      W                     O
```

B - Secondary Treatment

Figure 4

TABLE 5

Data Corresponding to Figure 4-B

Time Days	Oxy.Content PPM	Waste Content PPM
0	8	2.67
1	7.92	3.65
2	7.79	4.41
3	7.68	5.01
4	7.59	5.47
5	7.51	5.83
6	7.46	6.1
7	7.42	6.32
8	7.38	6.49
9	7.36	6.62
10	7.34	6.72
11	7.32	6.8
12	7.31	6.86
13	7.3	6.9

Another group may wish to change the type of treatment to test the hypothesis that a different type of treatment will be more effective in keeping the river clean. After each group of students states its own hypothesis and provides the teacher with values for specific variables in the POLUT program, the teacher enters the data into the computer. Results are collected by the teacher and returned to students who then decide whether their hypotheses are to be rejected or accepted. This process could be repeated as practicable.

It may appear that a lot of additional teacher time is being invested; however, the actual time needed to put values of variables into the computer and receive print-out of both graphs and data tables for five hypothetical groups of students is approximately 10 minutes. The outcomes are well worth the investment.

POLUT for Middle and High School Students

POLUT is designed for students in grades 10 through 12; however, middle grade teachers find that the program is applicable to students and content in grades 6 through 8. The major cognitive factors limiting use of the program are ability of student to interpret graphs, and ability to acquire basic knowledge of some terms related to water pollution and waste water treatment. Prerequisite knowledge is described in the Teacher's Guide which is available from Digital Equipment Corporation. A Resource Handbook and a Student Workbook are also available and most helpful in planning classroom activities. All documents are reasonably priced, but they are not absolutely essential components.

NOTE: POLUT is one of many computer simulation programs developed by the Huntington II Computer Project, State University of New York, Stonybrook, New York.

Exclusive publishing rights have been granted to Digital Equipment Corporation with corporate headquarters in Maynard, Massachusetts 01754. Write to this address for further information about available programs and costs.

THE NEED FOR MARINE AND AQUATIC EDUCATION*

Harold L. Goodwin and James G. Schaadt

The National Sea Grant Program came into being in October 1966 with the enactment of the Sea Grant College and Program Act. Its sponsors had a most ambitious goal -- to develop a solid base of practical, useful knowledge at colleges and universities by drawing on scientists and engineers who were committed to the ocean and its resources. The idea behind Sea Grant was, and still is, to direct all other disciplines toward a better understanding, use, management, and protection of the resources of the seas and the Great Lakes. A significant fraction of Sea Grant activity has been and is directed toward K-12 education, through teacher education and development and dispensation of educational materials. Below are reproduced sections of Sea Grant's Statement of the Need for Marine and Aquatic Education.

This statement outlines why marine and aquatic education is important, and defines it so that discussion can continue and at least spring from a common definition. The statement is not a program or a specific plan, although it does present some considerations that may be important when a program or plan is developed. We do not present the document as the definitive statement on the need for marine and aquatic education. It is a working paper, subject to improvement and modification.

The Need for Marine and Aquatic Education

The United States began as a sea nation, its life and economy tied closely to the seas, the great rivers and lakes. But while dependence on the salt and fresh waters has never diminished, and indeed is growing with new urgency and vigor, our nation of sea people has become a nation of landlubbers.

American education has been that of a land people. We have not been taught the importance or methods of protecting, using, and managing the resources of neighboring lakes, rivers and seas, coastal zones, and continental shelves. It has not been impressed upon us that the supply of fresh water is limited and cannot be increased. We have not learned that fresh and salt water are limited in their ability to contain our wastes, or that clean, fresh water is essential to our personal existence.

Excerpted from The Need for Marine and Aquatic Education to Inform Americans about the World of Water, by Harold L. Goodwin and James G. Schaadt. Newark, DE: Delaware Sea Grant College Program, University of Delaware, 1978. (ED 156 541).

The current educational content does not include our great legacy of maritime history. The teaching of current events seldom includes the facts of our daily dependence, whether we live on the coasts or far inland, on waterborne commerce. Even environmental education, accelerated by the Environmental Education Act of 1970, has not resulted in a measurable increase in our understanding of the ecological implications of how we use our fresh water supplies and coastal seas.

Water has been taken so much for granted that we perceive dimly, if at all, the importance of the oceans and fresh water supplies not only for the present, but for our tomorrows. The fact is that our personal, corporate, and national lives depend now, and will depend even more in the future, on the quality and supply of fresh water and the careful, planned use of the sea and its resources.

In advocating marine and aquatic education, there is danger that advocacy will be interpreted as a call for another subject to be added to the educational load. This is not the purpose.

The need for marine and aquatic education is more basic. It refers not to a subject, but to a fundamental that pervades all aspects of human life, one which should be woven into the total fabric of education. From water as the principal component and primary need of the human body to American dependence on the uses and resources of the sea for employment and a standard of living, marine and aquatic education should be built into nearly every subject taught in our schools. This is not to suggest that marine and aquatic education should dominate, only that the importance of water should so condition the subject matter of education that a balance with land and air is restored and water assumes the place its importance warrants.

Definitions

The Problem of Nomenclature

English, despite its remarkable range, flexibility, and opportunity for precision, does not have a common-use noun or adjective to embrace the entire world of water from salt to fresh, from vapor to ice. Hydrosphere is a perfectly good word to describe all the water on earth's surface and all that exists in the atmosphere, but it is not in common use. As an adjective to modify education, hydrospheric would confuse more than it would illuminate. Biosphere has been suggested but, although it might be reasonably accurate since it describes that part of the spherical earth where life is possible, i.e., where there is water, the word suffers from the same awkwardness and unfamiliarity.

Lacking the right adjective and noun, informing Americans about the world of water is most accurately described by the cumbersome term, *marine and aquatic education*.

A Definition of Marine

The sea covers 70.8 percent of the planet's surface and contains more than 97 percent of earth's water. While we divide the sea into regional pieces for geographic convenience, the sea is truly global. Each of the continental masses can be circumnavigated, although polar ice makes it feasible only for nuclear-powered submarines traveling under the ice. Without the Suez and Panama Canals, of course, circumnavigation would have to be from polar sea to polar sea. Nevertheless, any saltwater port on earth is reachable from any other saltwater port, at least from a fish's perspective.

The global sea is the planet's dominant feature. The Latin for sea is *mare*, source of our adjective, *marine*. The unifying characteristic of all things *marine* is saltiness. Consequently, the *marine environment* is that environment which contains or is directly influenced by salty water, whether it be the open ocean with salt concentrations of 35 parts per thousand or more, or the upper reaches of tidal rivers where salinity approaches zero. The Great Lakes are defined arbitrarily as part of the marine environment in U.S. legislation; it might be said that the freshwater Great Lakes are salty by Congressional definition, or because we refer to them poetically as "inland seas."

A Definition of Aquatic

Aquatic is defined as "of or pertaining to water," as a substance or habitat, though both the G & C Merriam Webster (2nd edition) and Oxford dictionaries rate the definition as "rare" or "obsolete". In common use, although such use is not extensive, *aquatic* generally refers to water in the generic sense. Except for water sports when it is applied to either salt or fresh, the word most often is applied to fresh water. Lacking a more precise and widely accepted word, *aquatic* is used in this statement to mean fresh water as distinct from marine, or salty, water. The purpose is to emphasize that *marine and aquatic education* includes water in all its forms and locations.

A Definition of Education

Because information about something as fundamental as water should be part of the basic knowledge of every person, the audience for education in our context includes people of all ages and conditions. The term *education* is used in its broadest sense to refer to the entire variety of experiences through which people learn: formal and informal educational activities from kindergarten to graduate school and continuing education; recreational, work, and life experiences, and all forms of communication from personal to mass media.

A Definition of Environment

Environment refers to the totality of physical, chemical, biological, social, economic, political, cultural, aesthetic, and structural surroundings of organisms, including ourselves and other people. Environmental education is, or should be, based on the principles of ecology, the study of relationships and interactions between living organisms and their environments and each other.

Marine and Aquatic Education

Given these definition of marine, aquatic, environment and education:

Marine and aquatic education is that part of the total educational process which enables people to develop a sensitivity to and a general understanding of the role of the seas and fresh water in human affairs and the impact of society on the marine and aquatic environments.

Marine and aquatic education is a part of environmental education.

The Goals of Marine and Aquatic Education

The goals of marine and aquatic education do not exist in isolation from other educational goals. On the contrary, they should be considered an integral part of the goals of environmental education, and a valuable asset in achieving the goals of general education. The goals are:

- To develop a public which has a basic understanding of the marine and aquatic components as part of the whole environment, and their importance to American life and society.

- To create a public with an awareness of and sense of responsibility for water; to evolve a new "water ethic" embracing the proper uses, protection, and conservation of the oceans, the coastal zone, and freshwater resources.

- To motivate people to take part in decisions affecting the sea and fresh water while equipping them with principles and information necessary to evaluate problems, opportunities and events.

Achieving these goals would result in the American public becoming "literate" in marine and aquatic affairs.

Some Assumptions

Without some basic understanding of such a primary aspect of life as the importance of the oceans and fresh waters to health, fortune, and the quality of life, people are ill-equipped to participate in or influence vital decisions affecting their own welfare. Therefore, education which does not treat the world of water in proper balance and perspective is incomplete.

When the world of water is included in the formal educational process, it is most often in science classes. It is not generally appreciated that sea and freshwater considerations are equally pertinent and necessary in the study and application of economics, sociology, political science, engineering, history, literature, and art. Marine and aquatic illustrations and experiences can enrich all of those subjects.

The waters of earth, especially the oceans, exert strong fascination for nearly everyone; the elements of wonder and drama inherent in the world of water can be used to engage the attention and enthusiasm of both teachers and students. Water is fun, whether for the child happily stamping in a puddle, the adult exploring the beach, or students fascinated by the mystique of the sea.

It must be reemphasized that marine and aquatic education seeks only balance in which the world of water is recognized as integral to all important aspects of human life, endeavor, and knowledge. Education about the world of water is not just another subject, but a part of the fundamental base on which all learning experiences should be structured.

There are schools where specialized courses in marine science or other aspects of the water world may be important and appropriate, but for marine and aquatic education in the broader sense to take its place and achieve its national goals, it must be incorporated into existing educational programs. The American educational system is both formal and informal, diverse, complex, and well-established. Finding the proper fit for marine and aquatic concepts will take time, effort, and ingenuity. The National Sea Grant Program has provided stimulus and expert assistance, but only the educational system itself can provide the means for reaching the goals.

New emphasis on teaching basic skills apparently is accelerating, but basics, to be interesting and meaningful, must be taught in terms of examples. Because of their inherent wonder and attractiveness, the oceans, lakes, and rivers make learning these skills more stimulating and enjoyable. These characteristics can improve the effectiveness of the educator and make the acquired skills and knowledge of longer lasting benefit to the learner.

In American education, every situation differs from every other in one respect or another. Nevertheless, there are elements common to any program of implementation. Here are some of them:

- Plans and processes for including marine and aquatic concepts and materials in the curricula should be studied for their application to each specific situation. Possibilities range from simple insertion of case studies and examples to small units, modules, field experiences, or even courses.

- Essential to a program of implementation are teachers trained and knowledgeable in marine and aquatic subjects and who are comfortable with incorporating them into their teaching. Implementation requires both pre-service and in-service teacher training. Marine and aquatic education should be integral to the education of teachers.

- Development of new materials to fit various educational situations should be encouraged and supported, with provision for pre-testing in the field before they are made generally available. In addition, testing the effectiveness of the materials and methods should be part of each project.

- Plans should include reaching adults through continuing and public education.

- Programs should advocate participation in marine and aquatic education by organizations to which Americans belong. Programs already in progress include, in some places, those of the Scouts, Girl Scouts, and Campfire Girls; the Coast Guard Auxiliary and the U.S. Power Squadrons, and 4-H groups. A few public aquariums and museums already provide special services to groups and the general public.

- The extent to which marine and aquatic considerations pervade our national and personal lives is so great and diverse that an initial step in implementation might be to decide which of the myriad aspects of the world of water have priority and should be learned by people everywhere if the goals of a basic understanding of and sensitivity to the seas and fresh waters are to be achieved.

Although this statement is not a program or the proposal of a method, but simply a statement on the need for marine and aquatic education, some viewpoints were expressed so consistently and forcefully at the workshops held to create this document that they represent recommendations of a significant percentage, and probably a majority, of participating educators. The recommendations were:

1. Identify, catalog and describe current marine and aquatic education activities as a necessary step in establishing communication among people and institutions with common interests, and make the catalog available throughout the educational system.

2. Give priority to orientation and training for both in-service and pre-service teachers, and to preparation of materials for teacher training.

3. Take strong, positive action to involve social science and humanities teachers, and additional natural science teachers in assessing existing materials useful to their curricula, and in development of new materials.

4. As quickly as possible, involve textbook writers and publishers in marine and aquatic education activities.

5. Provide federal funding for materials development and for teacher training, but leave application to the states and localities.

6. Be prepared for the long haul. Accomplishment of the goals of marine and aquatic education will take time.

Conclusion

The concept of education about the world of water is new only in degree. There always have been elements of marine and aquatic education in school subjects because it is simply unavoidable. Not that anyone has tried to avoid including the world of water; it is just that its importance has been submerged beneath what have appeared to be greater urgencies.

Perhaps the reason marine and aquatic problems have not demanded our attention as an urgent priority is that water is a very forgiving substance. Damage to the water environment and misuse of its resources are more a matter of slow accumulation of insults, degradations, and poor management than of a quick crisis. The damage seldom appears suddenly, except for a disaster like an oil spill or a water shortage.

The consequence of slow change is that we have arrived at a time of urgency so gradually that the change is perceptible to those intimately involved with the world of water, but not so apparent to people at large. The fact is that we already are late in calling for marine and aquatic education. To inform people takes time, and the more complex and broad in scope the information, the more time it takes.

A marine-literate society sensitive to and with understanding of the world of water will take at least a generation to develop even after momentum toward the goal of such a society is achieved. Before a generation has passed, the problems of the marine and aquatic environments will loom much larger in the public eye.

We have a choice: to wait, then react too late to the crisis that has become obvious, or to get on with marine and aquatic education so that the crisis may be avoided.

YOUTH ACTION TO IMPROVE THE ENVIRONMENT*

Stephen F. Hamilton

Agricultural extension programs have historically been "change agents," in that their mission is to bring to the public, normally at the local level, information based on research to improve local practice. In the paper below, a New York state 4-H guide is reproduced as an example of one type of service provided in such a manner.

Introduction

This guide is intended to assist adults working with youth in projects to improve the natural environment of their communities. I have assumed that a group of interested youth has already formed or that a one can be formed easily. Therefore, the guide says nothing about the important step of bringing together a group of participants. I have also assumed that the reader either has, or has access to, appropriate technical expertise. A bibliography is included to suggest starting points in the search for supporting materials, but the subject matter is too broad for an exhaustive listing of sources. *(Editor's Note: The bibliography has been deleted in this volume.)*

Young people have a special concern for the quality of our air and water and for the wise use of natural resources. This concern was first demonstrated on a large scale by the millions of youth who participated in the first Earth Day in 1970. A nationwide survey conducted that year with over 10,000 youth revealed that conservation of the environment was seen as the most pressing of the nation's problems.**

Young people have good reason to be interested in environmental quality: they will live their lives and raise their own children under the conditions being created today. Furthermore, concern for the environment may draw upon a wide range of subjects and skills that interest them, for example, chemical analysis, identification and natural history of plant and animal life, map reading and drawing, photography, public relations, government, law, history, and economics. By participating in an environmental project, youth can develop these subjects and skills in connection with a real task rather than in a classroom. Concern for the environment also appeals to the idealism often found in adolescents. An action project gives an outlet to this idealism and tempers it with experience.

**A 4-H community development project, 4-H Leaders' Guide, from the New York State College of Human Ecology and the New York State College of Agriculture and Life Sciences at Cornell University, Ithaca, NY, 1977. (ED 170 157).*

***Report on Poll 89 of the Purdue Opinion Panel, June 1970; p.7.*

There are also advantages to the community as a whole in having youth undertake environmental projects. Citizens at large and decision makers seldom have as much information as they can use in deciding environmental issues. Young people can collect needed information and transmit it to the public and to local officials. They can provide time, energy, and skills to accomplish tasks that benefit the community. A community that provides opportunities for young people to be involved in significant activities will assure itself of an active and informed citizenry in the future.

Two types of environmental projects are described in the following pages: information projects and work projects. Information projects involve youth in gathering information and then communicating it to the public and to community decision makers. Work projects are those in which young people do physical labor to improve the environment. Although it would be possible and desirable to combine these two approaches in one project, dealing with them separately helps to identify some of the different issues associated with each.

Information and work projects can both be distinguished according to whether they are youth-centered or adult-centered. A youth-centered project is one that is designed specifically for youth and carried out primarily by them. An adult-centered project is an activity that is normally carried out by adults but can accommodate participation by youth. Some of the considerations related to youth-centered and adult-centered projects will be discussed after examples of both have been described.

Environmental Information Projects: Youth-centered

Project LOST, Inc., (Laboratory of Scientific Testing) is a group of 20 North Rockland High School students and recent graduates who are trying to preserve the Grassy Point marsh on the Hudson River. The tidal salt marsh is in danger of being filled in for use as an industrial site, in addition to facing the constant threat of pollution. In order to increase public awareness of the beauty, the ecological value, and the educational and recreational potential of the marsh, Project LOST staged a "Save the Marsh" festival during three days of August 1975. The festival was organized and run from the Project LOST trailer located in the Haverstraw landfill.

The festival included nature walks through the marsh, tours through the power plant and sewage treatment plant near the marsh, and a visit from the sloop Clearwater. Counting the visitors to all of the festival's attractions and the people who learned about the marsh through associated publicity by radio, T.V., and newspapers, the young people made over 6,000 contacts with Rockland County residents. The future of the marsh remains in question, but Project LOST is currently pursuing two approaches to preserving it: the acquisition of scenic easements from property owners and outright purchase with federal funds designated for wetland preservation.

Project LOST grew out of the Advanced Chemistry classes taught in North Rockland High School. A Rockland County Cooperative Extension agent helped the group coordinate its efforts with those of two other student groups to design and implement a comprehensive study of the marsh and its tributary watershed. The agent also arranged for the students to meet with representatives of local government and industry to give them a balanced view of the trade-offs involved in preserving the marsh.

Project LOST members conducted studies of water quality, temperature, and flow, and of the plant and insect life of the marsh. They visited elementary schools to put on assemblies and work with individual classes. Some members pooled their savings to buy and equip a small van as a mobile laboratory. With the mobile lab they barnstormed fairs and shopping centers to demonstrate water-quality testing procedures and to appeal for help in saving the marsh. These appearances led to a number of requests for water testing by property owners and environmental groups. Some of these requests led to testing contracts, which provide a much-needed source of funds. Project LOST is licensed as a testing laboratory by the New York State Department of Environmental Conservation.

North Rockland High School provided the base of operations for the students and teacher-advisor, and made some equipment available. School officials allowed participants to work outside of school during school time. Cooperative Extension provided contacts with community groups and government agencies and helped establish an advisory committee including representatives from the School Board, League of Women Voters, business community, and environmental lobby. Cooperative Extension also secured the 4-H Community Development grant from Cornell University that financed the "Save the Marsh" festival.

If the students of Project LOST succeed in saving the marsh, their community will have been enriched by the preservation of an important and irreplaceable resource. However, the students themselves will benefit regardless of the eventual disposition of the marsh. They have learned how to perform sophisticated chemical analyses of water and air. They have learned how to identify plants, insects, and aquatic-life forms. They have learned some of the requirements for organizing environmental research. Moreover, they have learned to make decisions and execute plans as a group, with all the emotions, compromises, increased sensitivity, and self-confidence involved in cooperative effort. They have learned to deal with adults and to respect the wisdom of community leaders even as they have tried to influence their decisions. And they have learned of the workings of local government as they struggled to accomplish their goals. Through their involvement in this project they have developed a strong commitment to each other and to the improvement of their community.

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Site Identification

One of the most important steps in developing this kind of project is identifying a site for the study. If a group of young people becomes interested in a particular place or problem, this may happen without planning; but even then it would be wise to check the site against the following criteria:

1. The site or problem should be manageable. It should be possible for the youth to accomplish something substantial. The possible destruction of the earth's ozone layer by aerosols and supersonic aircraft is an example of an important problem that young people simply can't do much about through an environmental study.

2. The site or problem should be significant. It should be important to the whole community, adults as well as youth, and it should be important to the community's future.

3. The problem or site should be one about which decisions can be made on a local level and are likely to be made if sufficient attention is aroused.

4. The problem or site should offer participating youth opportunities for many different types of learning. Their work should not be limited to just one function, such as analyzing water quality. Rather the project should be like a tree that branches into many different subject matter and skill areas so that one participant can explore several branches and other participants who are interested in only one branch can contribute to the whole project by concentrating on their speciality.

The Ecological Approach

Ecology means interdependence. A project about the environment should reflect an ecological understanding not only of the natural environment but also of society. It is no service either to young people or to their communities to encourage a narrow-minded crusade. Young people should hear the opinions of industrialists and preservationists as well as conservationists. They should understand the choices inherent in conservation efforts. This is a difficult aim to achieve because so much of the discussion of environmental matters is done between "true believers" on both sides who refuse to acknowledge the complexity of the issues. The aim should not be neutrality, but the reasoned choice of a position and the ability to defend that position reasonably.

The ecological approach also implies a need to collaborate with and depend upon other groups, agencies, and local officials. Difficult as it is, building a broad base of support will accomplish a great deal more than independently advocating one group's opinion. This means that communication is an essential part of the project: communication among group members, with other groups and agencies, with the public, and with local decision makers. An environmental study group can learn a great deal by collecting information that they share among themselves. But they cannot influence community decision making without disseminating that information widely. The process of communicating is itself an important learning experience, involving such activities as publicity, writing, photography, and public speaking.

Environmental Information Projects: Adult-centered

Youth Membership in Decision-Making Bodies

Youth can be involved in environmental action and decision making through a wide variety of adult community organizations and acitivities. One method is appointing youth members to decision-making and advisory bodies. A few examples are: planning board advisory committees, Conservation Advisory Commissions, Environmental Management Councils,* land-use planning commissions, development commissions. The rationale for involving youth in these bodies is clear. Youth are citizens even before they reach voting age. They have both a right and a responsibility to participate in community decision making. Furthermore, they have a large stake in planning for the future of their community.

However, there are some special considerations that must be given to youth members of community bodies. One is that the youth members should be more than tokens. They should be chosen for their special interest and knowledge in the area, not solely because they are youth. Although they may be seen as representing the community's youth, they will be more effective representatives if they are unusually knowledgeable and committed. Second, youth members need some extra support, advice, and encouragement to enable them to participate effectively in a group of adults. They need someone with whom they can share their frustrations at the slow pace of change. Many of the adults who participate in community groups have years of experience; often they know other members well. This gives them an advantage over new members of the groups, especially young ones. Adult support can help overcome this disadvantage. Third, some provision must be made for turnover in youth membership. At the age of eighteen, many active youth leave their home community for college or work. Even if they remain in their community, they will lose contact with local hgih school students. Thus, a sixteen-year-old is likely to serve on a decision-making body for no more than two years. One way to deal with this predictable turnover is to appoint at least two youths of different ages so that as the older one leaves, the younger one remains to help orient a new youth member and provide continuity.

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*N.Y.S. legislation provides for the appointment of up to four youth between the ages of 16 and 21 to a county Environmental Management Council.

Youth Participation in Natural Resource Inventories

Another way to involve youth in adult-centered environmental activities is to include them in various environmental studies used in planning. The sophisticated research accomplished by youth in Project LOST demonstrates that they are capable of doing much of the work required by such studies. Some examples of studies are: preparation of environmental impact statements, monitoring of environmental quality, surveys of special features such as wetlands, and preparation of natural resource inventories.

Activities of this kind give youth a place in important community work and an opportunity to learn not only the knowledge and skills required by the study but also the organizing and decision-making processes related to the study and its use. Communication of study results is an essential part of the activity and entails important communication skills.

Another positive aspect of this type of activity is that it gives youth an opportunity to meet a community need, namely the need for people to accomplish important work. Youth have time, energy, and intelligence which often has no outlet in community service. By participating in environmental activities, youth become a resource to their communities.

The natural resource inventory is a good example of this approach. I shall describe in some detail how youth can be involved in natural resource inventories as a guide and an example.

A natural resource inventory is a process designed to provide data for community land-use planning. It brings together information from a variety of sources and displays that information in a fashion that makes it accessible to decision-makers. The typical product of a natural resource inventory is a set of maps and transparent overlays showing factors such as current land use, soil type, drainage, slope, vegetation, and agricultural potential. In combination, these maps and accompanying data provide invaluable information regarding issues such as the location of land fills, sites for industrial development, and preservation of open space and unique natural areas.

The process of conducting a natural resource inventory involves locating the appropriate data and base maps, transferring the data to maps and overlays, and checking the accuracy of the maps produced. This process entails a knowledge of maps, skill at map making, and ability to find and interpret data from a variety of sources. Presentation of the completed inventory is an important phase if the information is to be used, and this requires a number of communication skills. This work is normally done by lay volunteers, often members of environmental management councils or conservation advisory commissions. Experts in the process agree that high school students are able to learn and use the skills required and can be centrally involved in natural resource inventories.

Although youth have been involved in a natural resource inventory in at least one town in New York State, sufficient information to describe an actual case is not available. Therefore, the following outline of the process of involving youth in inventories must be considered tentative. It is written with the assumption that a Cooperative Extension agent, who might be either a 4-H or Community Resource Development (CRD) agent, would play a facilitating or linking role. One or more members of a group charged with responsibility for conducting an inventory could also perform this role. It would be important, though, for such people to take responsibility for the tasks assigned to the Extension agent in the following outline.

The process of involving youth in natural resource inventories can be thought of as having four phases: preliminary, training, implementation, and completion/continuation.

Preliminary Phase

The preliminary phase has three steps. First, the Extension agent (or other adult, or group of youth) must learn about local plans for an inventory. This can be accomplished by consulting local officials, particularly the chairman or staff director of the Environmental Management Council or Conservation Advisory Commission. Members of the county legislature, town board, or planning commission may also be knowledgeable.

The second step, assuming that an inventory will be conducted, is to obtain the agreement of the officials responsible for doing the inventory to the idea of involving youth. If these officials do not agree, then the work the youth accomplish might well be ignored; that would be a waste of their time and energy and a blow to their positive attitudes toward themselves and their community. If the officials do agree, then they should also agree to support the effort financially at least at the level they would have to support an effort by adults alone. At the least this means purchasing maps and supplies. It may also mean paying one or more adults to supervise the project. If the inventory would have been done professionally, it would be appropriate to use the money that would have been allocated to professionals to pay the youth for their work.

The third step of phase one is the recruitment of youth and adults to work on the inventory. The adults may be members of the Environmental Management Council or Conservation Advisory Commission who would normally be expected to conduct the inventory themselves on a voluntary basis. In this case, involving youth simply changes their role from taking sole responsibility for doing the work to helping the youth do the work. Youth can be recruited individually or as members of organizations such as ecology clubs, 4-H clubs, Scout troops, or science classes. Youth should be recruited from the community in which the inventory will take place.

Training Phase

The training phase prepares youth and adults to carry out the inventory. The Extension agent should take responsibility for arranging training. It involves skills in map reading, locating sources of data, transferring data to maps and overlays, and field checking information. This phase is important when adults conduct inventories and even more so when youth are involved. Youth involvement in a natural resource inventory will be a valuable experience only if they are held to the same standards of performance as adults. It is no favor to a young person to allow him or her to perform work of lower quality than would be expected of adults. Participants should use standard inventory methods so that the results are comparable to countywide and statewide information.

Training can be provided in several ways. Most often training is organized locally, on a county or town basis. Cooperative Extension personnel, County EMC staff, local professionals, or college faculty members are possible resources for training. Cornell's Resource Information Laboratory can provide training on a state or a local basis. Staff of the Department of Environmental Conservation can also assist in training.

Implementation Phase

The implementation phase has three steps. The first is the formation of the work group. The work group will include the youth and at least one adult advisor. Subgroups may be formed to carry out specific tasks. The role of the Extension agent at this point should be that of facilitator in the formation of the work group. He or she should help the advisor and members solidify their group and plan their work. Group formation should begin with agreement among the adults and youth who have been trained that they will conduct the inventory. Reaching explicit agreement on this point is important because some who participated in the training may be unready to make the commitment of time and energy required to complete the inventory. Commitment must be cleared up at the beginning to minimize delays and misunderstandings later. Agreement should cover not only the goal of a completed inventory but also the specific parts of the inventory. After training, some members of the group may feel incapable of doing everything that has been prescribed. The group should establish as clearly as possible what the inventory will include. This may mean simply whether the group feels capable of producing an inventory that meets the standards prescribed by the local Environmental Management Council or the State Department of Environmental Conservation. The next aspect of group formation is scheduling and apportioning the work load to assure that needed work is done in the proper order and that each individual or subgroup knows what to do and when it must be completed. Finally, an atmosphere of mutual support should be established to facilitate problem solving as the inventory gets underway. The planning that will take place cannot possibly encompass all contingencies; problems are bound to arise. Proper attitudes and procedures will help solve those problems.

The second step is the actual conduct of the inventory. Adult support is crucial at this stage. Even though a high degree of youth responsibility is desirable, adult assistance is necessary. Youth may feel unready to begin their part of the inventory without some gentle encouragement. Some may lack appreciation for the need to follow schedules carefully. Others may simply not know how to get started. Adults need not be authoritarian to overcome these and other problems. Often they can get youth started simply by offering a ride and a helping hand with the first task.

The third step of the implementation phase is conveying the completed inventory to the responsible officials. This may be accompanied with formal presentations, news coverage, and public hearings. The youth should receive recognition for what they have accomplished and the opportunity to present their work to the community. The local officials, in turn, should make proper use of the information and let the youth know that it will be used. Proper use might be immediate application to local planning, transmission to the Department of Environmental Conservation, or storage for future reference and comparison (with provision for easy retrieval).

Completion/Continuation Phase

After the inventory has been prepared and presented, the group of youth and adults may simply disband. On the other hand, they may choose, in consultation with the Extension agent and with local officials, to continue their work in a variety of ways.

One way would be to expand the public awareness component. This might entail seeking further coverage by news media, preparing displays, making public presentations before community groups, and otherwise attempting to inform the public about the inventory process and findings. In this way, youth could help to educate the public to the local situation, proper resource use, and the need for land-use planning.

Another option would be to offer the group's services in preparing additional inventories or more-detailed inventories of specific sites as they are required in the future. The work group might even evolve into a continuing youth organization devoted to community service through environmental research.

A third option, similar to the second, would be for the group to plan and conduct regular monitoring activities to keep track of conditions identified through the inventory. This would also constitute a continuing organization, but would be devoted to continuous tudy. For example, if an inventory revealed a problem of soil erosion from new housing developments, the group might wish to make plans for checking erosion on a regular basis to collect data that could be used in devising solutions to the problem.

A fourth possibility, compatible with the others, would be for the group to advocate community action to overcome a problem or protect a site that has been identified through the inventory as being important. This option would make the inventory group very much like Project LOST and similar groups.

A fifth possibility, compatible with the others, would be for the group of youth to attempt to become involved in adult groups or even stimulate the formation of broad-based citizen groups to advocate environmental action. Youth participants in a completed inventory would be well prepared to serve as informed members of existing environmental groups.

Work Projects

For some youth, an environmental study project is simply too abstract, too much like school work, to be appealing. One way to involve more of these youth is to undertake a project involving physical work to improve the environment. Some well-known examples of this type of project are clean-ups and tree planting. These activities have been done by large numbers of youth in organizations such as 4-H and Scouts. They have some value, but seldom involve participants in long-range action or give them the opportunity to learn much about the larger issues involved in environmental affairs. Some more promising activities are becoming more common in youth groups, such as recycling programs and stream improvement, which give participants continuing responsibilities and expose them to a larger range of problems and issues.

The creation of nature centers is a particularly valuable work project for youth. The remainder of this section will deal with this approach to work projects.

Creating Nature Centers

As concern about the environment has increased, there has been growing interest in the establishment of centers for environmental education. These centers range from elaborate, professionally staffed centers such as the Rogers Environmental Education Center in Sherburne, New York to a half-acre tract behind a school building.

Nature centers can serve some of the same functions as a park. They are preserves for trees, plants, wildlife, and human relaxation. But more than that they are an educational resource that can be used in many ways. Families and informal groups can visit casually on weekends to view the displays and demonstration areas, and to tour the self-guided trails. School classes and organizations can arrange guided tours either for general nature study or to explore a specific area of natural science. In some nature centers, advanced study and experimentation are conducted.

Some centers are described as outdoor education centers. This term includes not only nature study but also study of other subjects in the outdoors. For example, an outdoor education center might have a homestead site and offer activities designed to teach about the life of earlier residents in the community. It might also stimulate visitors to develop their mathematical skills by solving problems in the measurement of land and trees. Yet another kind of center focuses attention on the issues of land use planning. Regional maps, demonstrations of the dangers of unplanned development, and instruction in principles and techniques of planning may be found at such centers.

By participating in the development and maintenance of nature centers, young people can learn a great deal about the subjects involved in the centers. For example, planning a nature trail requires extensive knowledge of the plants, trees, wildlife, and topography of the area, appreciation of the problems in building a durable and attractive trail, and understanding of the functions that the trail will serve. The experience of working on a center can also provide other kinds of learning experiences. Young people may learn how to work together as a group, how to write educational and promotional materials, how to work with adults, and how local government functions in relation to their project.

Youth-centered

In 1974 Cortland County's 4-H camp was almost unused. Stricter health regulations and more rigorous enforcement had forced it to close as an overnight camp. Deteriorating facilities and dwindling resources seemed to foreshadow the abandonment of the camp. Two things happened to revive the camp. First, the county legislature appropriated a substantial sum to refurbish the camp, influenced in part by members of the 4-H Teen Council who made sure each legislator received several phone calls in support of the camp. Then a proposal was approved for a Youth Conservation Corps project at the camp.

According to the "Information Sheet" distributed by the New York State Department of Environmental Conservation, which administers the YCC in the state, the YCC has three equally important objectives:

1. Accomplish needed conservation work on public lands.

2. Provide gainful employment for 15- through 18-year-old males and females from all social, economic, ethnic, and racial classifications.

3. Develop an understanding and appreciation in participating youth of the country's natural environment and heritage.

The outcome of the Cortland project can be viewed from two perspectives: the work that was accomplished and the learning of the participants. The work is easy to see and impressive in its scope and quality. Over two miles of nature trails were constructed, including several bridges, the

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largest of which spans 25 feet. Guide booklets were prepared for the "Transition Trail" and "Woodland Heritage Loop." The cellar hole of an old farm house was excavated as part of the "Homestead Trail." Forest and landscape improvements included thinning a larch plantation, clearing brush, and developing wildlife habitat. Camp facilities were improved to help the camp meet health requirements and to make it usable in the fall and spring. Work included building additions to the main lodge, demolishing unusable cabins, refurbishing other cabins, and building a storage shed.

The learning of participants is less easily observed. Trips to the Rogers Environmental Education Center in Sherburne and the Beaver Lake Nature Center in Baldwinsville were informative and stimulated participants' ideas about plans and facilities for Camp Owahta. The staff gave instruction in topics such as the succession of species and plant and tree identification, both in scheduled sessions and when "teachable moments" arose. The same combination of planned and spontaneous instruction was used in the critical area of safe and effective use of tools. Participants were encouraged to enter into the planning and decision-making process, and they made many decisions about matters such as where to locate trails and how to build a bridge. Many opportunities also arose for career education as participants did various jobs and talked with adults who came to the camp. Those adults included a forester, environmental educator, bus driver, conservationist, biologist, mason, heavy-equipment operator, and carpenter.

Participants were chosen from all over the county on the basis of recommendations from school guidance counselors. The group intentionaly included participants with varied backgrounds. The majority were "average," neither outstanding leaders nor troubled youth. Because of the excellent leadership provided by the staff, this diverse group of young people did outstanding work and, in the process, became a cohesive group.

The YCC is sponsored nationally by the Departments of Agriculture and Interior. The federal government provided 50% of project costs. The remainder was made up from contributions of cash, goods, and services. Contributors included the New York State 4-H Foundation, the New York State Division for Youth, Cortland County 4-H Foundation, Cortland County Legislature, and several individuals and businesses.

One advantage of the YCC is that payment of participants attracts a much wider range of youth than a voluntary project normally would. Hence the group as a whole is likely to be much more diverse in place of residence, social class, ethnic background, school performance, post-high-school plans, and race.

Voluntary labor can also be employed to build a nature center. Probably the easiest way to arrange this is to line up existing groups of young people to do specific tasks at specific times. For example, a Scout troop might be scheduled to build a half-mile nature trail on a Saturday, a building trades class to construct a pavilion during school time, and a 4-H club to clear brush on a school vacation day. It is also possible to form a group of youth who are willing to make a long-term commitment to creating the center and to use their labor regularly.

One important consideration in using volunteer labor is planning and coordination. A center cannot be attractive and educationally sound if each group of volunteers works independently. There must be an overall plan that each group contributes to. Otherwise, the pavilion may be built where the Scouts put their trail the previous week. One person should coordinate planning and scheduling work so that anyone who is interested in the center can contact one person to learn what needs to be done. This person should work closely with a group of youth and adults who have ultimate responsibility for the design and development of the center. Members of this group must have an idea of what they want to create and good information on what is possible at the site. One of the first steps in planning is to study the site carefully to learn what special features it has, what kinds of trails and areas can be developed, and where they should be located.

Provisions should be made in creating a nature center with voluntary labor for the involvement of different youth in different kinds of tasks. It should be possible for some youth to participate in planning while others come to work on a trail, for some to supervise work crews and others to prepare trail guides. The diversity of tasks makes it possible for youth with widely varied skills and interests to play a part. Opportunities for expanding a young person's interests and skills should not be overlooked. Someone who knows carpentry may be a good instructor for another who is an expert on ferns. The one may find learning about ferns enjoyable when working with the other to make an instructional sign. Everyone should be able to contribute the knowledge and skills he or she has and to learn new knowledge and skills.

Adult-centered

Adults are almost always the initiators and major decision makers for large-scale nature centers involving large amounts of land, permanent buildings, and professional staff. However, youth can be involved in both the planning and the labor that goes into the creation of elaborate centers.

The minimum level of youth involvement would be helping with the maintenance of an existing nature center. Groups of young people could assist in clearing brush, resurfacing trails, cleaning up litter, and refurbishing facilities. An activity of this sort might make a good community service project for an existing youth group such as a 4-H club or Scout troop.

A more challenging and educational level of youth involvement would be helping to upgrade and expand an existing center. Youth could work with adults to improve trail guides or signs and to create new trails and study areas. They could collect specimens for display and help construct new facilities. Youth could work with adults to improve trail guides or signs and to create new trails and study areas. They could collect specimens for display and help construct new facilities. Youth could even help to create new educational programs.

Another way in which youth can participate in an existing nature center is by serving as guides. In many cases the best way to learn something is to try to teach it. The learning received by youth nature-trail guides before, during, and after guiding groups of people around a nature center would well repay the effort. In one county, plans are underway to form a corps of teenage trail guides who will be available to meet requests from school classes and other groups wishing to tour a nature center. Two factors are crucial in this type of project: training and coordination. Guides must all meet minimum standards of knowledge about a specific trail and the subject matter related to it, and the skill in presenting information and responding to questions. Once a group of trained guides is formed, their services must be publicized and organized in such a way that all have opportunities to work and to improve their skills.

Youth can also be involved in the planning and decision making for creating a new large-scale nature center. The most obvious way is to include youth with adults on whatever committees or boards are organized to plan the center. In addition, youth can help with some of the preliminary steps such as locating potential sites and collecting information about them, performing a complete inventory of a site, and making presentations for publicity and fund-raising purposes. Once youth are part of the planning process, there are many things they can do. The first and most important step is for youth to be there when the planning is being done. Unfortunately, adults tend to overlook youth at this stage, often without intending to exclude them. Sometimes the idea of involving youth never comes up for the simple reason that the adults meet during school time.

After the planning stage, youth can work independently or with adults to do the labor involved in creating a center. Several different approaches are possible. Work days might be scheduled when anyone from the community, youth and adult, is invited to come work on the center. This requires careful planning and supervision if the available energy is to be put to good use. Another approach is to invite only organized groups: clubs, school classes, institutionalized youth. This approach still requires planning but supervision is built-in. A third approach is to form a group whose main function as a group is to work on the center. This approach would be likely to work only if the youth were paid or if they were also involved in planning for the center. A combination of these approaches is also possible.

Most continuing activities, whether done by youth or by adults, revolve around a committed core group. The core group includes both the obvious leaders and the highly committed followers, all of whom are willing to put in time regularly and extensively. One of the best ways to involve youth in an adult-initiated nature center is to try to form a core group of youth who will participate in planning, help with the labor, and bring other youth into the process on an occasional basis.

One potential problem with involving youth in helping to create adult-initiated nature centers is a difference in time perspective. An elaborate nature center might take five years or more just to plan. Many of the youth who became involved at the beginning of the planning will have left the community for education or work by the time it comes to fruition. Furthermore, a long period of committee meetings, fund raising, and proposal writing is not nearly as interesting to most youth as building trails. However, adults should not assume that their time perspective excludes youth. Some will become committed participants anyway.

Involving youth of different ages, as recommended above for youth membership in decision-making bodies, provides some continuity in spite of turnover in youth participants.

A Comparison of Youth-Centered and Adult-Centered Environmental Projects

The preceding examples of information and work projects using both the youth-centered and adult-centered approach suggest some comparative advantages and disadvantages to using either approach. The advantages of each approach are generally disadvantages to the other.

Youth-centered projects have the advantage of capitalizing on the peer orientation of youth. Young people like to be together and to identify with a group. By participating in a youth-centered project, a young person has the opportunity to form strong ties to a group of youth who are engaged in productive action. In addition, the fact that most of the people involved are young makes it possible for a young person to take a great deal of responsibility and to exercise some control over many aspects of the project. Participants in a youth-centered project can be relatively autonomous of adults. The extent of youth responsiblity, control, and autonomy depends upon the skill with which adult leaders support youth in exercising and developing these prerogatives.

Adult-centered projects, in contrast, offer youth the opportunity to become involved in the larger community, which is composed primarily of adults. Youth participants then develop personal relationships with adults other than their parents or teachers, relationships that are too rare in our society. A second major advantage of involving youth in adult-centered projects is the relatively lower cost in terms of time and energy as well as money. Although adult support is crucial in both approaches, more volunteer adult advisors are available when youth become participants in adult-centered activities than when youth work on their own projects.

Ideally one community would offer its youth opportunities to participate in both youth-centered and adult-centered environmental projects. Practically, a choice must often be made. The choice should be based on the interests of youth and adult participants, the unique opportunities in a particular community, and the resources available to support the project.

Some More Ideas for Environmental Projects

The preceding examples are just a few of the many possible types of environmental improvement projects young people can do. A single project could combine several of the approaches described. Some more suggestions follow to stimulate thinking and demonstrate the range of possible projects.

Recreational Trails

In addition to using trails for nature study, as described above, people use trails for hiking, bicycling, horseback riding, cross-country skiing, snowmobiling, and motorcycling. Creating recreational trails involves assessing the need and potential use for them, finding suitable locations, obtaining easements from land owners or the government, laying out the trail, mapping, clearing, building bridges, controlling erosion, marking and publicizing the trail, and maintaining it. Assistance should be sought from appropriate organizations, such as hiking or snowmobile clubs. Trails on state land require approval from the Department of Environmental Conservation.

Environmental Quality Monitoring

Young people can perform regular tests on the quality of water or air and on amounts of noise in their communities. Regularity is essential. So is the use of standard testing methods if the results are to be used seriously. Such an activity must be done in collaboration with organizations or agencies concerned with maintaining environmental quality so that the results can be acted upon. Often such organization or agencies lack sufficient resources to conduct all the monitoring they would like to do, and youth can fill that gap.

Environmental Impact Statements

Statements are being required for a growing number of proposed actions. Often they are prepared by professionals, but some voluntary groups have prepared statements, too. Youth can help such efforts. Most of the procedures described above in connection with natural resource inventories apply as well to environmental impact statements.

Recycling

Running recycling centers has been one of the most popular youth action projects to improve the environment. When scrap prices are high, recycling centers generate cash which can be used to support other activities. Another kind of activity related to recycling that youth might attempt is promoting recycling on a municipal or industrial basis. The most dramatic way to do this would be to conduct a feasibility study showing that a municipality or industry could save money by recycling. The technical challenge of such a study is formidable, but it would be very exciting.

Public Awareness and Legislation

Pollution control, returnable bottle laws, energy conservation, and protection of unique natural areas are among the kinds of issues facing law makers at all levels of government. Youth can influence decisions by contacting lawmakers directly and by urging others to do so. One of the only effective sources of influence young people have on legislation is gathering and disseminating information.

The use of mass media is an important tool in public awareness. Reports, brochures, and other written material can also be used. Exhibits, demonstrations, photographs, and films help to arouse interest. Classes or workshops can provide detailed information and training. One student ecology group organized a speakers bureau to spread their message.

Nonpolluting Energy Sources

Many young people are already involved in the search for simple and efficient methods of deriving usable energy from the sun, the wind, and other nonpolluting sources. Although a good deal of technical knowledge and skill is required, the field is new enough for gifted amateurs to make important contributions.

Wildlife Habitat and Stream Improvement

Many groups of youth have helped plant wildlife cover and food, made nesting boxes for waterfowl, or curbed stream bank erosion. This activity should be conducted in collaboration with responsible agencies and interested organizations. Most stream work and some activities affecting wildlife require the permission of the Department of Environmental Conservation.

Conclusion

The project examples and ideas in this guide indicate the endless possibilities for youth action to improve the environment. What you do will depend upon a combination of your interests and community needs. Participants in any project will have to make three major decisions:

1. What is our focal point?
2. What type of activity should we do?
3. What will be the relationship of youth to adults?

The first question has to do with the content of the project. Will it address a natural site, a single environmental issue, or a range of issues? The second question is related to the distinction between information projects and work projects. Will the chief activity be physical labor or the collection and dissemination of information? The third question asks whether the activity will be youth-centered or adult-centered. Will youth participate in an activity that adults would normally do without them or will they develop an activity primarily for youth?

Regardless of the answers to these three questions, any project needs both a committed group of youth and at least one skilled adult. Some projects provide opportunities for occasional participation by large numbers of youth, but all require that at least a few youth participate regularly and intensively to gain the knowledge, self-confidence, and skill to take leadership. Although it is conceivable that a group of youth would work without any adult assistance, most successful projects involve an adult advisor. This role is a difficult one to play because the advisor must be able to give assistance without taking initiative away from youth leaders and to share his or her expertise without dominating.

If you choose to attempt an environmental improvement project, you must be prepared for frustrations, not only in regard to the primary goal of accomplishing your tasks, but also in the equally formidable process of creating an effective working group. Your frustrations should be tempered by the realization that you are experiencing firsthand the joys and the trials of active citizenship.

TOWARD AN ACTION PLAN*

Walter E. Jeske

A landmark intergovernmental conference on environmental education took place in Tbilisi, Georgia, USSR, in 1977. This summary report of that conference by Walter E. Jeske, a member of the U.S. delegation and at that time Chief of the Education and Publications Branch of the Soil Conservation Service, U.S. Department of Agriculture, and Chairman of the Subcommittee on Environmental Education of the Federal Interagency Committee on Education, was delivered at the 25th annual meeting of the Conservation Education Association in Logan, Utah, in August 1978.

If ever a group could echo the words of Henry V, "We few, we happy few, we band of brothers," it is the members of the Conservation Education Association (CEA), who have labored for a quarter of a century to initiate, stimulate, improve, and maintain conservation, outdoor, resource-use, and environmental education efforts in schools and nonformal education institutions. Long before the histrionics of Earth Day Teach-Ins, CEA members had designed and implemented holistic conservation education programs. With pride, CEA could point to some significant achievements in the form of successful and continuing conservation education endeavors. With even greater pride, CEA can now take satisfaction from its role, and that of its members, in shaping some of the events and forces that have opened new opportunities for giving environmental education higher priority among concerns in education. Among those accomplishments was the lead role CEA assumed in creating the Alliance for Environmental Education and the continuing support CEA gives the Alliance and its activities.

Last year, your CEA annual meeting program theme gave emphasis to the need for an international perspective in environmental conservation education. That was a logical follow-up to the North American Regional seminar on Environmental Education held in October 1976 in St. Louis under the auspices of the Alliance as part of preparations for the Intergovernmental Conference on Environmental Education that was to be held in October 1977.

As one of the United States delegates to the Intergovernmental Conference, my primary purpose today is to report to you on what the governments of the nations of the world decided at that meeting. In addition, I will report a few of the efforts being initiated in the United States to follow-up on the Intergovernmental Conference, ask for the help CEA in doing some of that

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*Abridged from *Toward an Action Plan: Report on the Intergovernmental Conference on Environmental Education to the Conservation Education Association*, by Walter E. Jeske. August 1978 (ED 161 712).

follow-up work, and share with you some of my perceptions about the agenda for the future of environmental education in our country.

The boundaries often drawn between foreign and domestic matters is increasingly artificial. Many of the major problems humankind faces (inflation, unemployment, environmental degradation, food supply, resource depletion) are common to many nations and can be resolved or alleviated only through international cooperation -- bilateral, regional, or worldwide. Global interdependence is a fact whether one considers economics or ecology. That was the basic rationale for conducting, from October 14 through 26, 1977, in the USSR, the conference with the unwieldy title: "Intergovernmental Conference on Environmental Education."

Organized by the United Nations Educational, Scientific and Cultural Organization (Unesco) in cooperation with the United Nations Environment Program (UNEP), this was the first intergovernmental conference to address the issue of environmental education directly and comprehensively.

It was not just another meeting of a few hundred experts and lay people concerned about environmental education. This was a ministerial level meeting that is second only in importance to a Unesco General Conference. Ministerial level means that the chief officers for education and for environment of the nations of the world were heads of official country delegations.

In keeping with the level of responsibility of the conference, it was conducted according to formal rules of procedure and in all five working languages of Unesco: Arabic, English, French, Russian, and Spanish. All presentations and formal discussions were translated simultaneously into those working languages. Each formal action of the conference was the product of official votes of delegates from Member States. As such, they constituted formal international actions to be reported back to the individual member governments for appropriate action.

Official delegations from national governments of 66 nations participated in the conference in the city of Tbilisi, capital of the Soviet Socialist Republic of Georgia. Situated in the foothills of the Great Caucasus in southern Russia, about equidistant between the Black and Caspian Seas, Tbilisi is home for nearly 1 1/4 million people. In addition to the official conference delegates, there were observers and representatives from 8 organizations and programs of the United Nations system, 3 other intergovernmental organizations, and 20 international nongovernmental organizations.

The Tbilisi conference was the culmination of the initial 3-year phase of the Unesco/UNEP Internation Program for Environmental Education that grew out of the United Nations Conference on the Human Environment, held in Stockholm in 1972. In October 1975, environmental education experts from 65 countries met in Belgrade, Yugoslavia, to critique and revise 14 papers prepared earlier as working documents on various aspects of environmental education throughout the world. As part of their effort, those experts formulated recommendations and guidelines for a comprehensive, cooperative international program of action in behalf of global environmental education.

The materials generated by the Belgrade workshop were the basic working documents for a series of six regional seminars on environmental education held in 1976 in Brazzaville, the People's Republic of the Congo; Bangkok, Thailand; Kuwait; Bogota, Columbia; Helsinki, Finland; and St. Louis, Missouri.

After the regional seminars, most countries established national planning committees to consider the recommendations of the regional meetings and to prepare their nation's positions and materials for the conference. For example, in the United States, a national task force of 75 members was set up under the aegis of the Federal Interagency Committee on Education. The task force included individuals from federal and state governments, industry, academia, and nongovernmental organizations. That group invested substantial effort in reviewing current environmental education materials and programs and in combing for United States position statements the proceedings and papers emanating from national conferences, including:

1. The National Conference on Environmental Education, held in December 1970 in Green Bay, Wisconsin;

2. The National Conference on Environmental Studies Programs in Higher Education, held in December 1972 in Green Bay, Wisconsin;

3. The National Working Conference on Emerging Issues in Environmental Education, held in June 1974 in Ann Arbor, Michigan (ED 158 974);

4. The Environmental Education Perspectives and Prospectives Conference, held in July 1975 in Snowmass, Colorado (ED 121 595, ED 121 612); and

5. The North American Regional Seminar on Environmental Education, held in October 1976 in St. Louis (ED 143 505).

As a result of systematic preparatory efforts, such as that in the United States, most of the country delegations went to Tbilisi very well prepared to work on the conference's five major agenda items:

1. Major environmental problems in contemporary society

2. The role of education in facing the challenges of environmental problems

3. Current efforts at the national and international levels for the development of environmental education

5. International and regional cooperation for the development of environmental education.

Nine working documents for the conference were prepared by Unesco and UNEP secretariats. All were highly useful to conference participants. One of special value, and which is available from Unesco publications sales offices, was entitled "Trends in Environmental Education." It contains the edited and revised papers originally prepared for the 1975 Belgrade conference.

At the Tbilisi conference, delegates kept their attention focused directly on the substantive issues of the agenda. There appeared to be genuine unanimity of purpose in finding workable strategies for advancing environmental education. Unlike other recent intergovernmental conferences, there was little cant and political rhetoric. I believe the conference succeeded (a) in creating the necessary framework for broad programs of international cooperation, (b) in agreeing on goals, objectives, and guiding principles for environmental education, and (c) in devising practical recommendations for action in environmental education by Member States. In the United States and in other countries, the conference in Tbilisi _is_ fulfilling its promise and _is_ stimulating action in behalf of environmental education.

An international environmental education conference cannot accomplish very much environmental education in and of itself. Its role is to define problems, to suggest approaches to resolving those problems, and most especially, to focus the attention of governments on environmental education as one effective tool in human efforts to wisely develop the earth's resources and enhance the quality of life while safeguarding the ecosystems upon which all life ultimately depends.

The conference adopted a 60-page draft final report that the Unesco Secretariat edited and published in May 1978. That report was sent to all Member States of the United Nations and to individuals who participated in the conference. Apparently, additional copies are not available from Unesco.

The final report contained 41 recommendations. Among them was an international framework for environmental education consisting of a goal statement, objectives, and guiding principles. The goals of environmental education were stated as:

1. To foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural communities.

2. To provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment.

3. To create new patterns of behavior of individuals, groups and society as a whole towards the environment.

The complete recommendation, including the objectives and guiding principles for environmental education and the goals just mentioned, is given in an Appendix to this paper. At the Alliance-sponsored 1978 National Leadership Conference for Environmental Education held last March, one of the actions suggested was that of getting widespread agreement in the United States on these goals, objectives, and guiding principles. The Alliance would appreciate having a response from CEA as well as from individual members. You might also take a copy and encourage other organizations with which you as an individual are affiliated to consider endorsing or offering comments on the broad goals, objectives, and guiding principles.

The 41 recommendations adopted at Tbilisi represent numerous other areas of agreement among nations, ranging from emphasis on environmental education as a lifelong process to the vital role that nongovernmental organizations (NGOs) must play if there ever is to be anything approaching universal environmental literacy.

The last two conference recommendations dealt directly with NGOs. One recommendation is that Member States should encourage and support NGOs at local and national levels. Another is that NGOs should incorporate environmental education activities in their programs. Thus, the Conservation Education Association and other NGOs have encouragement from the highest international levels to strengthen their environmental education efforts. CEA is in a unique position to do much to help extend and advance environmental education to the level described by Dr. Mary Berry, chief education officer of the United States, in her address to the Tbilisi conference when she noted:

> We are here to see that the world's new awareness of the importance of our relationship to the environment -- a new environmental conscience -- suffuses all education, all teacher training, all coursework in whatever subject -- and, indeed, all the education activities of life.

It is important that we sustain the momentum for environmental education generated by the Tbilisi conference and preparations for it. Already underway in the United States are some continuing endeavors that are a direct follow-up to recommendations of the conference. Among those endeavors are:

1. Publication of the 34-page document Toward an Action Plan: A Report on the Tbilisi Conference on Environmental Education. (ED 155 463). That report was produced by the Subcommittee on Environmental Education of the Federal Interagency Committee on Education. In addition to a straightforward report on the meeting, it contains a digest of all conference recommendations and a discussion of some implications of those recommendations for education in the United States. As

chairman of the FICE Subcommittee on Environmental Education, I pledge to do all that I can to see that environmental education gets some attention among our national priorities.

Mary Berry stated in the preface to the report, "We must move toward a coherent national strategy for environmental education that takes full advantage of the strength of our diversity. We must make sure that all essential items are provided for, that unnecessary redundancies do not squander our resources, and that adequate coordination is maintained."

As I sense it, the time is right for taking some first steps to devise a workable, comprehensive, national action plan for environmental education. Putting together such a plan is going to require some compromises. Policy makers at all levels must hear a clear call to address accomplishable goals instead of a cacophony of conflicting voices. The investment of more energy in adversarial tactics than in cooperation and the bickering and divisiveness among factions that proclaim themselves the true high priests are a deadly threat to environmental education in this country. To elicit support, any strategy or plan will have to provide for appropriate division of labor among the various elements of the private sector (such as professional groups, business and industry, labor, academia, nature centers and parks, museums, zoos, and the like) and the different levels and agencies of government.

2. Another important follow-up to the Tbilisi conference was the national From Ought to Action: National Leadership Conference conducted by the Alliance for Environmental Education in Washington D.C., in late March 1978. That conference focused on positive, purposeful, and practical action for environmental education. Conferees crafted 16 specific recommendations, ranging from creation of a national environmental education center to action for state legislation for environmental education. Initial efforts to implement many of the recommendations are underway. The proceedings of the conference are available from the Educational Resources Information Center (ED 159 076).

Though not direct descendents of the Tbilisi conference, I mention the following three environmental education activities as types of efforts by different agencies and organizations that are a necessary part of conference follow-up in the United States:

1. The FICE Subcommittee on Environmental Education, with major assistance from the ERIC Science, Mathematics, and Environmental Education Center at The Ohio State University, published in June 1978 a 165-page book entitled Environmental Education Activities of Federal Agencies (ED 152 600). It

contains descriptions of the environmental education objectives, activities, programs, accomplishments, and plans of some 40 Federal Governmental agencies. This volume is the first step in identifying gaps and overlaps in environmental education coverage at the Federal level.

2. As an example of one Federal Government agency's new efforts in behalf of environmental education, the Heritage Conservation and Recreation Service (formerly the Bureau of Outdoor Recreation) in the U.S. Department of the Interior has prepared and sent for review to many organizations and individuals a report and recommendations on inclusion of environmental education in the congressionally mandated National Outdoor Recreation Plan that the agency is to submit to the President and Congress this year.

3. As an example of work by a large national nongovernment organization, the National Association of Conservation Districts (NACD) has prepared and is reviewing at regional conferences a Conservation District Guide for Education Programs (ED 170 127). The Guide is designed as a step by step approach to planning and implementing successful environmental education programs for use by each of the 3000 conservation districts in the United States. Development of the Guide was stimulated by a series of regional workshops held last year involving conservation district directors and educators.

The report on the Tbilisi conference prepared by the FICE Subcommittee on Environmental Education sketches a few broad implications of that conference for education in the United States. But there are numerous significant and practical actions that need to be taken now to influence the scope and extent of environmental education. Among the important opportunities that CEA, its members and others might well help address are these:

1. Environmental education should connect itself strongly to the coming growth areas in education. With the school age population on a down trend, workers needing almost constant retraining to survive in the modern labor market, increasing concern about relation of food to human health, a general commitment to life-long education, a larger proportion of women entering the labor market, and the continued growth in numbers of adults participating in organized learning activities, it is apparent that growth areas in education include vocational education, early childhood education, nutrition education, and adult education. Little has been done to infuse concepts of harmonizing human activities with ecosystem processes into those areas of education.

2. The long-sought teacher centers are to become a reality soon. The U.S. Office of Education anticipates that about 60 centers will be operational early in 1979. Designed to meet

the practical and real inservice needs of teachers and giving teachers major responsibility for the kinds of training and curriculum development programs that will best meet their needs, the centers could be especially important avenues for infusing environmental education throughout school curricula. One outcome of the conference conducted by the Alliance for Environmental Education last March is to be the preparation by the National Education Association and the American Federation of Teachers of the comprehensive rationale for environmental education to be distributed to teacher centers. That is only a start; much more should be done to offer appropriate help to each center.

3. Education is a function of the states in our nation. Thus, there is a special need for strong, nongovernment state-level organizations supportive of environmental education. Characteristics of an effective state-level alliance for environmental education include:

   (a) membership by nongovernment organizations only
   (b) rapid and efficient communication system
   (c) organizational members representing all sectors of society
   (d) strong and innovative leadership
   (e) capability for taking necessary political and other action for environmental education.

4. Many agencies of government have or should have a legitimate interest in good environmental education. Through cooperation they can accomplish vastly more than each could achieve alone. In addition to an alliance of nongovernment organizations, it would be highly beneficial to create something like a mini-FICE in each state, an entity through which all government agencies could get their environmental education acts together.

5. The entire field of environmental education needs a more effective communications system, an interactive, flexible network to which all who are even peripherally engaged in environmental education have access. In such a system, provision should be made for horizontal connections at every level as well as vertical communication about nearly any aspect of environmental education. Getting an efficient network into operation should be a high priority action item.

6. Government agencies will have to provide environmental education programs for their employees and managers if those agencies are to make effective contributions to improving environmental literacy. Agencies outside the sphere of education need to help their people learn educational process if they are going to deal with teachers. Just as important,

education agencies have to give all their employees some basic understanding of environmental science and accurate information on environmental issues.

7. State departments of education must have strengthened capabilities for providing leadership and service in environmental education. At a minimum this means having a full time environmental education coordinator or program leader in the department. The coordinator position needs to be so imbedded in the department's structure that the board of education does not cut it when they feel the pressure for tax reductions or want to change emphases to reading and counting in the name of basic skills. As a corollary, state boards of higher education also need to have strengthened capabilities to encourage environmental studies programs at colleges and universities.

The seven practical opportunities for action that I've mentioned are largely organizational in nature. Progress in accomplishing any of them would simply open doors for initiation, stimulation, improvement, and implementation of more and better solid environmental education efforts throughout the nation. I have not mentioned a whole array of substantive, perplexing, and continuing problems and issues in environmental education that need serious attention -- problems and issues such as rigorous intellectual development of the philosophical and conceptual underpinnings of environmental education; the general tendency of environmental educators to present strongly the biased view that all human impact on natural systems is negative; the issue of quality of inservice teacher training for environmental education; the misuse of inquiry-discovery teaching techniques in environmental education; the continued lack of creative, hands-on learning opportunities in many programs labeled environmental education; the limited testing, use, and distribution of most environmental education materials.

No good purpose is served by lengthening our list of ideas for action in behalf of environmental education or the brief enumeration of substantive issues and problems. Among all the major institutions of society, only education in its myriad forms can provide the leadership for rational, adaptive response by all citizens to the resource constrained economies that North Americans will face in the future. The test of environmental education is to be found not in philosophy and well-turned phrases but in positive performance. Performance judged on the degree to which it enables each citizen to cope intelligently with the ecological, economic, social, personal, and political decisions required for the rational use and protection of our common environment. Delivering that level of performance is our job!

Appendix: Goals, Objectives, and Guiding Principles for Environmental Education*

The goals of environmental education:

1. to foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas

2. to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment

3. to create new patterns of behavior of individuals, groups and society as a whole toward the environment

The categories of environmental education objectives:

1. Awareness: to help social groups and individuals acquire an awareness of and sensitivity to the total environment and its allied problems

2. Knowledge: to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems

3. Attitudes: to help social groups and individuals acquire a set of values and feelings of concern for the environment, and the motivation for actively participating in environmental improvement and protection

4. Skills: to help social groups and individuals acquire the skills for identifying and solving environmental problems

5. Participation: to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems

Some guiding principles for environmental education:

Environmental education should:

1. consider the environment in its totality - natural and built, technological and social (economic, political, technological, cutural-historical, moral, aesthetic)

2. be a continuous lifelong process, beginning at the pre-school level and continuing through all formal and non-formal stages

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*These were agreed upon by delegates from 66 nations attending the Intergovernmental Conference on Environmental Education in October 1977.

3. be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective

4. examine major environmental issues from local, national, regional and international points of view so that students receive insights into environmental conditions in other geographical areas

5. focus on current and potential environmental situations, while taking into account the historical perspective

6. promote the value and necessity of local, national and international cooperation in the prevention and solution of environmental problems

7. explicitly consider environmental aspects in plans for development and growth

8. enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences

9. relate environmental sensitivity, knowledge, problem-solving skills and values clarification to every age, but with special emphasis on environmental sensitivity to the learner's own community in early years

10. help learners discover the symptoms and real causes of environmental problems

11. emphasize the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills

12. utilize diverse learning environments and a broad array of educational approaches to teaching/learning about and from the environment with due stress on practical activities and first-hand experience

STRATEGIES FOR IMPLEMENTATION: THE KENTUCKY PLAN FOR ENVIRONMENTAL EDUCATION[*]

Kentucky Department of Education

State education agencies have traversed varying pathways in attempting to meet their responsibilities with regard to environmental education; some have done more than others. A number have developed "state plans for environmental education," which also vary in approach, comprehensiveness, and levels of implementation. As the last chapter in the 1982 revision of its "Guidelines," the Kentucky Department of Education has identified the strategies below for implementing its state plan.

As defined by Webster, a strategy is "the science and art of employing the political, economic, psychological and military forces of a nation or group of nations to afford the maximum support to adopted policies. . . " The strategy for environmental education must employ all of the above as tools for developing a statewide program. Although these forces are necessary to support the implementation, it is obvious that not all groups will be effective in use of all these forces. Different groups will have different responsibilities. To identify these responsibilities or roles is to identify the strategies for implementation.

There are specific roles for each of the five main goals identified in the previous sections. There are several broad categories of groups that will have input into the implemntation of these goals. This section will identify the role of these groups with respect to specific goals of orientation, program development, physical resource utilization, promotion and dissemination, and program implementation. The categories, representative of most groups, are the Kentucky Department of Education, institutions of higher education, schools (K-12), special interest groups, and governmental groups. Each category will be discussed with respect to the inputs and the role each will assume in the implementation of goals.

GOAL: Teacher Orientation

Kentucky Department of Education: This department will have the overall coordinating responsibility for both in-service and pre-service education. Services to be provided include consultant services to colleges and universities, assistance in the organization of formal programs of study for environmental education, consultant services to public and private schools for in-service, and consulting with non-education groups in providing services for teacher orientation.

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[*] *Excerpted from Guidelines for Environmental Education: The Kentucky Plan, edited by Jerry Howell. Frankfort, KY: State Department of Education, 1982 (ED 213 599).*

Institutions of Higher Education: Kentucky's colleges and universities will have major responsibilities for pre-service education through appropriate departments. Other responsibilities include the offering of environmental educational programs as integrated into specialized study areas and the development of in-service programs.

Schools (K-12): The school systems have the major responsibility for in-service training of staff, including classroom teachers and student and teacher-aides.

Special Interest Groups: These groups may sponsor or provide technical and logistical assistance in support of in-service and pre-service programs. Other activities may include the providing of specialized curriculum supplements to educational groups and in providing funding for special programs involved with teacher training.

Governmental Agencies: Local, state and federal agencies may sponsor or provide seminars and conferences on teacher orientation, and financial assistance for teacher orientation activities.

GOAL: Program Development

Kentucky Department of Education: This department will have responsibility for the overall coordination of program development in environmental education. Activities will include the provision of adequate staff for statewide coordination, the piloting of new, exemplary curricula, the development of model curricula, the development of model curriculum projects, the provision for consultants on curriculum development projects, the limited financing of projects in program development, and assistance in securing funding from other sources for program development activities and the aggregation and dissemination of information relating to environmental education.

Institutions of Higher Education: Colleges and universities shall have the major responsibility for pure and applied research in the field of environmental education as well as clearinghouse responsibilities. Other areas of responsibility include the development of model curricula, the establishment of exemplary sites and demonstrations, the providing of consultant services, and the provision of substantial undergraduate and graduate experiences in program development in environmental education.

Schools (K-12): Within the organization of schools lies the responsibility for program implementation. The development of community resources into program aids is a significant part of this responsibility. Other activities include:

1) appointing a coordinator with major responsibility for environmental education

2) Obtaining local support for program efforts, and

3) seeking funding from outside sources.

Special Interest Groups: Expertise within special interest groups is a valuable resource for program development. The major input of these groups is in provision of supplemental services, materials, occasional funding of special programs, and non-formal education program presentations.

Governmental Agencies: Withing the realm of program development, several governmental groups have developed self-contained instructional programs for use by educators. Technical assistance is another valuable asset provided by these groups. Other activities include the promotion of specific themes, such as energy, wildlife, soils, litter, population, etc., and the funding of special programs related to the purpose of the governmental groups.

GOAL: Physical Resource Utilization

Kentucky Department of Education: As physical resources, such as school sites, residential and non-residential resource centers, develop in Kentucky, the Kentucky Department of Education shall have the major responsibility for developing materials that aid educators in the interpretation and integration of these resources into their existing courses of studies. Such materials shall facilitate involvement of non-education groups and encourage these groups, governmental agencies, special interest groups, and industry, to construct, make available, or provide personnel to assist in the development of regional resource areas throughout Kentucky.

Institutions of Higher Education: Kentucky's colleges and universities have major responsibilities in establishing regional models using available physical resource areas and in providing consultant services to other educational programs in the development and integration of such areas.

Schools (K-12): LEAs and the schools within the systems have special responsibilities in identifying local physical resources such as industries, treatment plants, museums, forests, nature centers, parks, school sites, etc., as educational supplements to their curriculum. Equal effort should be directed toward the regional resources. Ultimately, it is the responsibility of the school to coordinate the use of local and regional resources with the total school curriculum.

Government Agencies: Since many of these agencies have access to special lands, facilities, and personnel, their input lies primarily in the realm of providing open access and technical assistance to education groups desiring to use these areas. Special emphasis should be given to the promotion of these areas by the governmental agency.

Special Interest Groups: These groups will be encouraged to participate in environmental education programs by making their physical resources available to LEAs. The Kentucky Department of Education, institutions of higher education, LEAs and governmental groups can disseminate information regarding their available resources through state associations, environmental education conferences and media.

GOAL: Promotion and Dissemination

Kentucky Department of Education: The maintaining of an Advisory Council for Environmental Education and the collection and dissemination of environmental education information is the primary role of the Kentucky Department of Education. Activities should include the publishing of a statewide newsletter, the organization of an annual statewide conference on environmental education, the release of periodic press announcements and articles, the establishment of a dissemination and information network throughout the state, the promotion of regional clearinghouses and the organization of a statewide association for environmental education.

Institutions of Higher Learning: The colleges and universities should function as centers for regional clearinghouses for environmental education. They should be involved in the development and dissemination of promotional literature and each should have an officially designated contact-liaison responsible for environmental education and representation in the statewide dissemination network.

Schools (K-12): LEAs should promote and disseminate program information on local programs and maintain a contact-liaison individual as representative in the statewide dissemination network. Special efforts should be made to disseminate information to the classroom teacher.

Special Interest Groups: Special interest groups making presentations and/or distributing their own promotional material should be identified as such. When dealing with controversial issues, every effort should be made to present differing views.

Governmental Agencies: In addition to the promotion of specialized study programs, governmental groups should disseminate information relating to the availability of facilities, programs, and personnel that would be of use to schools. The U.S. Government Printing Office publishes much material relating to the environment and suitable for use in environmental education programs. These publications, as well as specially developed technical material, should be made readily available to school groups. Each participating governmental group should become a part of the statewide dissemination network.

GOAL: Program Implementation

Kentucky Department of Education: The state program manager for environmental education shall maintain a record of reports submitted by the local board of education relating to implementation and shall be responsible for dissemination of the findings.

Institutions of Higher Education: These institutions shall assist the local board of education and the state program manager in the development of assessment techniques, tests, and surveys for the purpose of reporting on program implementation.

Schools (K-12): The teachers have the major responsibility for integrating environmental education into the curricula. Each school will support and encourage their teachers in this effort. The schools will administer evaluative instruments relating to environmental education program implementation.

Special Interest Groups: These groups will assist in the promoting of environmental education through non-formal contacts.

Governmental Agencies: These groups will assist in promotion of program implementation through their individual mandates and available resources.

AN EXPERIMENTAL EXAMINATION OF ALTERNATIVE STRATEGIES TO PROMOTE ENERGY CONSERVATION IN HIGH SCHOOL YOUTH*

by Martin G. Kushler and William S. Davidson

If education can be said to take place only in situations resulting in change in behavior, the research project summarized in this paper represents education at its best. It also presents a workable model for those interested in promoting positive energy conservation behaviors in secondary school students, as well as for those involved in educational research.

The intent of this paper is to introduce and present the preliminary findings of an on-going research project examining alternative means of encouraging energy conservation in high school students. The questions addressed in this project were: 1) is it possible to reliably measure energy conservation attitudes in high school youth, 2) is it possible to influence teachers to teach about energy and energy conservation, 3) what types of strategies would be most effective in influencing teachers to teach and 4) what impact would this teaching have on attitudes and self-reported behaviors of high school students. The answers to each of these questions seem fundamental in planning the future of energy conservation efforts in America.

The Problem

In the six years since the 1973 oil embargo, the awareness of the need for energy conservation has become painfully obvious to policy-makers in the United States. Unfortunately, the prime motivating force among citizens for the conservation of energy has been to "save money" (D.O.E., 1977). Indeed, too little attention has been focused on the economic, social and environmental implications of energy resources and usage. Furthermore, governmental policies addressing the "energy problem" have tended to favor technical, production-oriented solutions emanating from the physical sciences (Ferber, 1977; Shippee, 1978) while giving little emphasis to behavioral approaches to energy conservation (Winett, 1976; Ferber, 1977).

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With respect to the school-age population in particular, a recent national survey of energy awareness among young adults (conducted for the National Center for Education Statistics) concluded that, while general awareness of an energy problem is increasing, America's students are lacking in knowledge of basic energy facts; show little evidence of being prepared to select practical energy options for the future; and expect to be able to continue to depend on high energy use (National Assessment of Educational Progress, 1978). Further, this study found that most students appear to be obtaining what information they do have about energy from the media rather than through schooling. In conclusion, the consultants recommended a broad-based effort toward the infusion of energy facts and information into current school curricula.

Additional evidence of the lack of activity by the nation's schools in this area is provided by a recent nationwide survey of state energy education policies (Education Commission of the States, 1978). This study concluded that

> While some exemplary materials on energy are available for incorporation in the usual school curricula for grades K-12, there appears to be little widespread communication and cooperation within or between states to further energy education. Few state legislatures and/or offices have provided input, financial or otherwise, into the K-12 energy education effort. (pp. 46-47)

One notable exception to this pattern, however, is a current research project in Michigan which is examining alternative means of encouraging energy conservation in high school youth.

Background: The Michigan Energy Extension Service Project

In mid-1977, the Michigan Department of Commerce, through the Michigan Energy Administration, received a $1.1 million grant from the U.S. Energy Research and Development Administration. This award was one of ten similar grants awarded to ten pilot states around the country (Michigan, Wisconsin, Washington, Wyoming, New Mexico, Texas, Alabama, Tennessee, Pennsylvania, and Connecticut). The Michigan Energy Extension Service (MEES) pilot program was designed to educate Michigan residents about the need for and methods of energy conservation and utilization of renewable energy sources.

The youth component of this grant made Michigan's proposal unique among the ten states selected. One of the major objectives of the Youth Project was to create an "energy conservation ethic" in 50,000 high school age students. More specifically, the EES Youth Project has also attempted to examine the relative effectiveness of various strategies in terms of influencing attitude change and energy consumption.

The early months of this project focused on laying the ground work for the upcoming intervention. In particular, much effort was spent on developing the evaluation instrument to be utilized by the Project. Following extensive pilot testing and careful analysis, using a combination of rational and empirical processes (e.g. Jackson, 1971), a final highly reliable 45 item attitude measure was constructed. The attitude measure was combined with a series of demographic related questions and a set of self report of behavior questions and placed on a single convenient, machine readable survey form. Subsequent use of this instrument with over 100,000 high school students in nine states has demonstrated consistent reliability and very encouraging validity results. (Please see Stevens & Kushler, 1979, for a more complete discussion of this instrument.)

Following this initial development phase, plans were constructed for a pilot testing of some actual intervention strategies. The overall plan of the Youth Project pilot was to try out several strategies during the first school year of the project and, upon identifying the most successful strategies, restructure a more effective program to test during the second school year. In this pilot phase, the general strategies examined included two types of assembly presentations, a teacher training workshop, and a type of youth group participation model.

Briefly summarized, the results indicated that the two assembly strategies were not at all useful in fostering energy conservation, while the youth groups and teacher training strategies were moderately effective (though the youth groups were found to be procedurally difficult to implement). Most encouraging was a correlational finding that students who had taken an energy conservation-related class, regardless of what other intervention their school had received, were significantly more positive in terms of attitudes and self-report behaviors. (See Stevens, Kushler, Jeppesen & Leedom, 1979, for a detailed report of these results.)

In addition, in a small substudy by MEES (Leedom, 1978), the particular strategy of having youths participate in a "task-oriented" activity (whereby they actually engaged in some energy conserving behavior) was found to be strikingly effective in producing positive attitudes. This finding, in addition to being empirically encouraging, is congruent with various other theoretical positions concerning attitude change (e.g. Breer & Lock, 1965; Festinger, 1957; Bem, 1965, 1972; etc.). Hence, a reexamination of this strategy was built into the current research design.

The Current Research Project

Drawing on the results of the first phase, MEES began a second research effort in the fall of 1978 which more specifically focused upon strategies to encourage teaching of energy conservation. The procedures that were followed are briefly outlined below:

Subjects

A population of 124 high schools in 15 counties throughout Michigan was identified with the assistance of the Michigan State Department of Education. The 15 counties were selected to contain a good mix of rural, suburban, and urban areas. The high schools themselves include a mix of approximately 80% public and 20% private (religious) schools.

The schools range in size from 150 to 2200 students and include a variety of racial and socioeconomic mixes as well. Hence this study should provide for good generalizability to high schools in almost any setting. In addition, in order to provide for the soundest methodological procedures, these schools were randomly assigned to treatment and control conditions.

Design

The experimental design was a one-way analysis of variance with five levels of treatment condition (control, teacher consultation, teacher training workshop, teacher workshop including "task-oriented" training, and energy committee consultation). To use the terminology of Campbell and Stanley (1966) the experiment was a "post-test only" design. There were three major categories of dependent variables, including: teacher response (in terms of teaching about energy); student attitudes; and student self-report of energy conservation behavior.

Procedure

All schools in the experimental conditions first received a general introductory letter from the Michigan Energy Extension Services (MEES). The purpose of this letter was to acquaint the principal with MEES and to introduce the regional MEES coordinator. The regional coordinator then contacted the principal by phone to arrange a meeting with him/her, at which time the coordinator briefly explained the program which had been selected for that school and asked the principal to set up a meeting with teachers he/she felt would be interested in such a program. As is often the case in such large scale field research, a number of schools did not wish to participate in this program. Fortunately, the percent of refusals was virtually the same for all five conditions (approximately 20%).

Thus, a final sample of 95 schools actually completed the procedures described below.

For all experimental conditions, the teacher meeting began with the MEES coordinator explaining the MEES program in general, the importance of energy conservation, and how teachers can play a role in promoting wise energy use by teaching about energy in their classes. Following the introductory segment, the coordinator then outlined the particular services being offered to that school. Briefly summarized, the four treatment conditions consisted of the following:

1) Teacher Consultation -- The coordinator would present him/herself as a resource person for the teachers and attempt to persuade and assist teachers to teach energy conservation topics in their classes. As a part of this effort, the coordinator would hand out to the teachers some standard energy education curriculum packages (e.g., National Science Teachers Association curriculum packages) and provide them with a list of additional energy related materials (e.g., filmstrips, curricula, visual aids, etc.) available through regional or state MEES offices. The coordinator would emphasize his/her availability as a consultant, at their initiative, in the future. In response to any subsequent requests by teachers, the coordinator would meet with them (individually or in small groups) to provide information or materials.

2) Energy Committee Consultation -- The role of the coordinator was virtually the same as in the teacher consultation condition, except that a major area of effort was devoted to getting the teachers to form an "energy committee" within the school. Membership on the committee was recommended to include representatives from diverse groups such as teachers, principal, custodial staff, students, cafeteria staff, etc. The purpose of the committee would be to discuss energy saving topics relevant to the school including teaching; energy project; and saving energy in the school buildings. In addition, teachers were provided with curriculum materials and encouraged to teach just as in the consultation condition.

3) Teacher Workshop -- The coordinator's role here was to recruit the teachers to attend a 5 hour workshop (including one hour for a complimentary dinner) presented free of charge by MEES. The workshop itself included presentations by MEES consultants including lecture, media (films and slides), small group discussions and demonstrations of curriculum materials. In addition, the same materials provided in the consultation strategies were also provided to the teachers at the workshop.

4) Teacher Workshop Including "Task-Oriented" Training -- This condition was essentially identical to condition #3 above except that this workshop included the presentation and demonstration of "Task-oriented" curriculum materials (e.g., involving the actual saving of energy, as discussed previously). Once again, the same set of curriculum materials (with the addition of two task-oriented project booklets) was provided to these teachers as was provided in the other three conditions. (Note: each type of workshop was standardized in format such that workshops provided at different locations were essentially the same in content. Also, the workshops were all provided by the same team of MEES consultants.)

All treatment interventions took place in late October and early November. To avoid any "history" effects or bias due to time of year, the intervention schedules were staggered such that the different treatment conditions were all implemented over the same time span.

Data Gathering

At the conclusion of the first semester of the school year (approximately late January to early February) teachers were contacted by the coordinators and given packets of Youth Energy Surveys to distribute to their students in each class, as well as short questionnaires for themselves to fill out (concerning their own attitudes, perceptions and teaching activity for that semester). In addition, as a validity check, approximately one-third of the teachers received telephone interviews soliciting essentially the same information as requested in the written questionnaires.

During this same time period, the coordinators entered the control schools with the same approach discussed earlier, identified groups of interested teachers in those schools, and had them fill out and distribute the same questionnaires (control teachers also received telephone interviews). As is ethically required in such a situation, following this data gathering the control teachers were provided with the same materials and services earlier available to the experimental teachers.

Findings

Although the results of this study are still undergoing further and more detailed analysis, it does appear possible to respond to each of the four questions raised in the introduction.

With respect to the first question, it does indeed seem feasible to reliably measure energy conservation attitudes in high school youth. The MEES Youth Energy Survey has demonstrated strong internal consistency in repeated small and large scale applications totaling over 100,000 youths. In addition, a variety of small scale studies examining the validity of this measure have found that it is significantly positively correlated with such factors as: youths' self report of energy conservation behavior; teacher's self report of energy conservation related behaviors suggested by teachers; size of car youth owns; and, most encouragingly, with actual energy consumption records (home electricity use) of the youths' families. Although these results are but a tangential product of the experiment discussed here, the findings should be of interest to those involved in energy conservation efforts. (Again, the reader is referred to Stevens & Kushler, 1979.)

With respect to the second question, the results clearly suggest that it is possible to influence teachers to teach about energy and energy conservation. Table 1 provides the data concerning the number of participating teachers in each condition who did and did not include energy education in their classes.

Table 1

Teacher Response by Condition

	(1) Consultation	(2) Committee	(3) Workshop	(4) Task-Workshop	(5) Control
Taught Energy	41 (70%)	32 (78%)	51 (74%)	44 (67%)	25 (40%)
Did Not	18 (30%)	9 (22%)	18 (26%)	22 (33%)	38 (60%)
	59	41	69	66	63

N=298

(Chi-square analysis for these data is significant at $p<.001$)

As one can see from the table, each of the four treatment conditions was clearly superior to the control condition. (It is interesting to note that these effects cannot be explained by such extraneous factors as sex of teacher or subject taught by the teacher. The observed results were found to be consistent across these variables.)

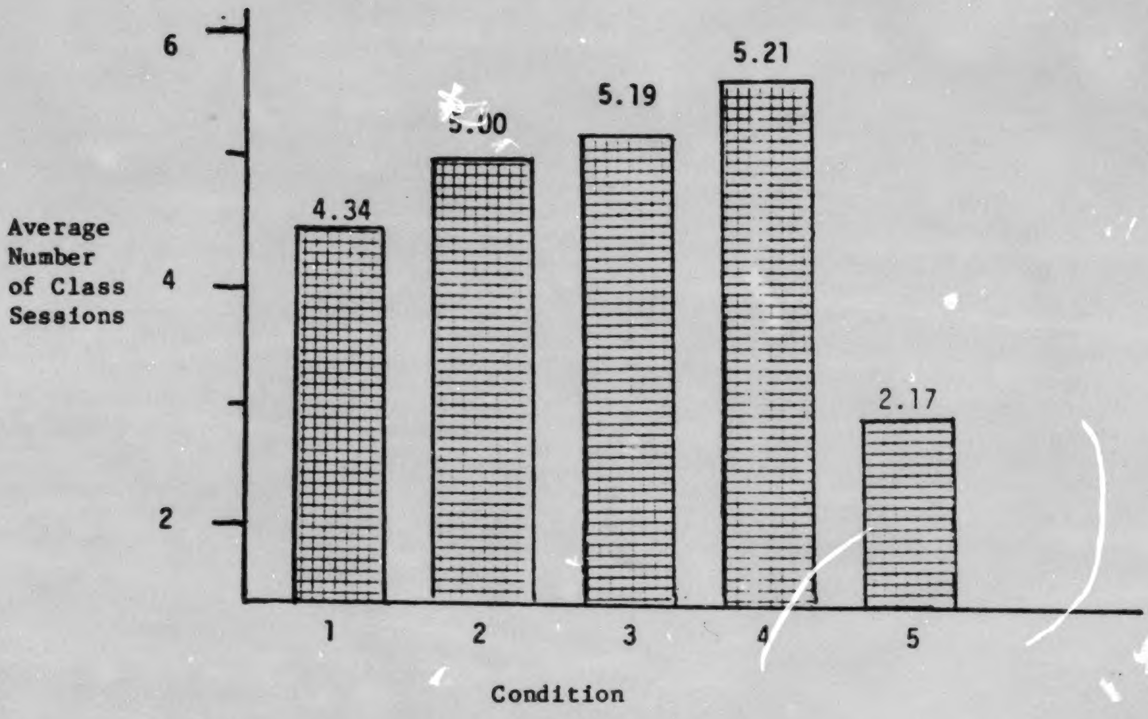
Another way of examining this question is to consider the average number of class sessions that the teachers in each condition spent on energy education. Graph #1 illustrates the findings of this variable.

Once again, the data indicate that it is indeed possible to influence teachers to provide more energy education to their students. This also is a very encouraging finding.

With respect to question number three, there do appear to be some distinctions between the four treatment conditions in terms of results. For the variable of whether or not a teacher taught energy, Table 1 reveals that groups 2 and 3 tended to be superior. For the variable of average number of class sessions taught, Graph #1 shows that groups 3 and 4 tend to be slightly superior to groups 1 and 2. For an additional variable of whether or not the teacher utilized the materials provided to them, groups 3 and 4 reported using at least some of the materials nearly twice as often.

Graph #1

Number of Class Sessions Taugnt by Condition



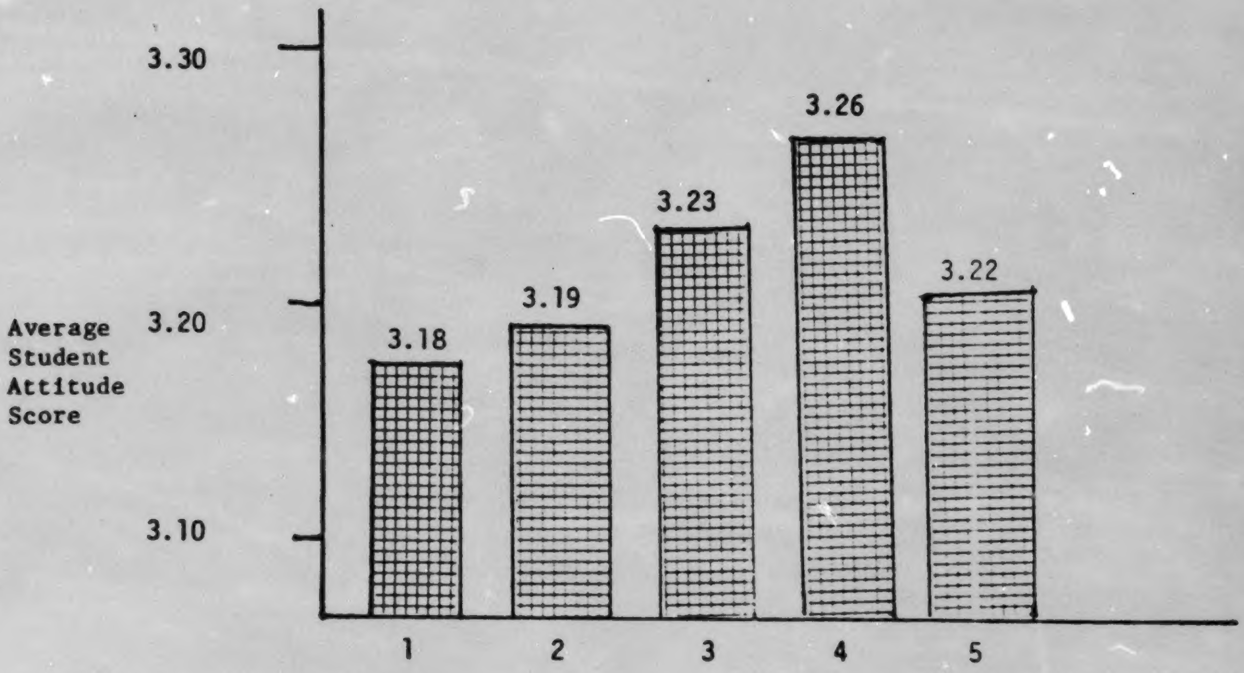
(The analysis of variance for these data is significant at the P <.005 level. Scheffe tests reveal that all four treatment groups are significantly higher than the control group, and that groups 3 and 4 are significantly higher than groups 1 and 2.)

(50%) as the teachers in groups 1 and 2. (Unfortunately space does not permit the presentation of all relevant tables in this paper.) Finally, with respect to student responses (which will be discussed in a moment) groups 3 and 4 tend to produce higher scores on both attitude and self report behavior data. In summary, it appears that groups 2, 3, and 4 and particularly groups 3 and 4, which are the two workshop conditions, are somewhat superior on most outcome variables.

Finally, with respect to question number four, the results are somewhat mixed. Graph #2 presents the overall average student attitude score for each condition. (Note: these data are computed as an average student score for each teacher, then summed and averaged across all participating teachers in each condition. The grand mean thus computed was 3.22 with a standard deviation of .15. High scores represent positive attitudes toward conservation.)

Graph #2

Average Student Attitude Score by Condition

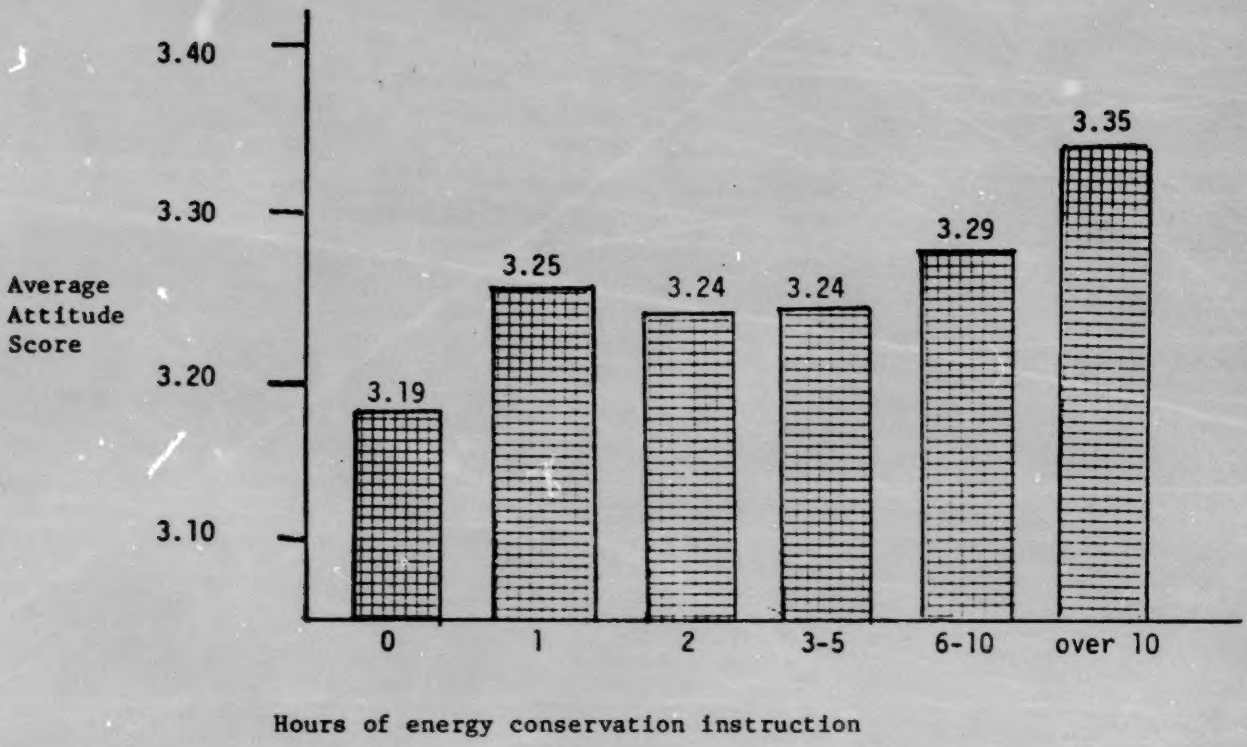


(The analysis of variance for these data is only significant at the P = .05 level. SCHEFFE tests found no significant differences among the individual groups. A more liberal STUDENT-NEWMAN-KEULS procedure revealed that group 4 was significantly higher than the other four groups at the .05 level.)

As one can see from these data, the effects of the intervention per se were not strong enough to produce major differences between the treatment groups and the control group in terms of student attitudes. One possible explanation for this finding is that the treatments applied to teachers were not powerful enough to produce ultimate student responses. Another possible explanation is that treatment teachers who only taught a little or not at all helped water down the overall results. Whatever the actual reasons, it was decided to further examine the available data in an effort to understand the findings.

In particular, since the treatments did produce more teaching behavior it was decided to directly examine the relationship between teaching and student scores. To do so, the data were broken down to the level of individual classes. Graph #3 provides a breakdown of the average student attitude score per class, for classes that received various amounts of energy conservation instruction.

Graph #3



As one can see from this graph, there is a fairly consistent positive relationship between amount of instruction and student attitudes. These results are statistically significant and the magnitude of differences observed are quite comparable to those obtained in earlier research by MEES. This finding is encouraging because it suggests that attempting to promote the teaching of energy conservation topics is a worthwhile activity even though no striking overall differences between conditions were visible in student attitudes.

Finally, the outcomes in terms of student self reported behavior were also examined. Using a total scale score of the nine youth tasks, the questionnnaires, analysis of variance and Scheffe tests revealed that groups 2, 3, and 4 were significantly better than groups 1 and 5, and further, that group 4 (task workshop) scored significantly higher than all other groups. In addition, it was observed that there was a strong positive relationship between the score on this measure of energy conservation behavior and the number of courses in which a youth reported having had energy conservation instruction. These results are important because they suggest that the experiment may indeed have had a positive impact on energy conservation behaviors and, in particular, that the task workshop strategy fostered the most actual energy conservation behavior.

Conclusions

In summary, it appears that this study has provided a number of interesting findings. First, it has helped demonstrate that a reliable and valid measure of high school student energy conservation attitudes can be developed and conveniently utilized in a large scale research effort. Second, it has demonstrated that a variety of techniques involving direct consultation or workshop presentations can be successful in getting high school teachers to teach energy topics in their classes. Third, although the direct experimental evidence is not strong, it suggests (and indirect correlational evidence strengthens this conclusion) that classroom instruction and activities can have a positive impact on energy conservation attitudes and behaviors. It is encouraging to note that each of these conclusions reaffirms findings generated in earlier MEES research efforts (see Stevens, Kushler, Jeppesen & Leedom, 1979).

However, as mentioned at the outset of this report, much analysis remains to be done. In particular, MEES is interested in more closely examining what specific classroom instruction techniques appear to have the greatest success. For example, MEES is now considering a set of detailed follow-up interviews to be conducted with teachers whose students scored highest on the attitude and self-report behavior measures, in an effort to gather information about their classroom activities. Indeed, the findings reported in the study should be regarded as just a preliminary indication that educational interventions in the area of energy conservation are feasible and show hope for success. Much work remains to be done in exploring what types of interventions, delivered in what manner, with what materials and by whom, are most successful. Given the current and projected energy situation, it is certainly time that such research receives the increased emphasis that it deserves.

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THE FUTURE OF THE ENVIRONMENTAL MOVEMENT[*]

Stuart Langton

How thoroughly intertwined is environmental education with the environmental movement? Some people move back and forth between them with no perceptible shift in gears; others point out that the nature of the educational enterprise is such that it is an inappropriate vehicle for "preaching" environmentalism. In this essay Stuart Langton projects the possible future of the environmental movement, with implicit food for thought for those whose concerns are educational.

The "Third Wave" of the Conservation Movement

In 1963 former Secretary of the Interior Stuart Udall wrote The Quiet Crisis, which portrayed the environmental problems of the time and which called for "a ground swell of concern . . . which could culminate in a third wave of the conservation movement."[1] In the fifteen years since, we have seen such a "ground swell of concern" in changing public attitudes, in the formation of countless environmental groups, and in the creation of thousands of pieces of environmental legislation at all levels of government.

In fact, since 1963 we have witnessed the unprecedented success of the "third wave" of the conservation movement. While only a few dozen national environmental groups existed in early 1960, there are approximately 350 groups today.[2] Although there was little effective federal legislation in 1963 to preserve the environment, by 1969 the National Environmental Policy Act was passed and by 1970 the Environmental Protection Agency was established. In 1965 only 17% of Americans identified the reduction of air and water pollution as a problem warranting government attention, but, by 1970 53% said government should be concerned with these issues.[3]

Today, despite the threat of energy shortages, inflation, and other signs of economic unrest, an even greater proportion of Americans are concerned about the environment. A recent Harris poll indicates that 65% of the people disagreed with the proposal to "slow down environmental clean-up to ease the energy shortage," and 64% disagreed with the statement that we should "slow down the clean-up of air and water pollution to get the economy going again." Further, protecting the environment ranked higher (at 60%) as a national priority than did creating hundreds of thousands of new jobs (44%) and decreasing dependence upon foreign oil (53%). Another recent survey of 100,000 people in North Carolina also confirmed the extent of public support for environmental protection in relation to economic development. In that survey 85% of those polled thought it important to attract new industry to the state, but 89% felt it was also important to protect the environment.[4]

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These results indicate that the "quiet crisis" of the environment is no longer a quiet matter. In truth, environmental concern has become a significant aspect of American life. The "third wave of the conservation movement" has culminated.

The Institutionalization of Environmental Concern

During this period we also witnessed the development of an Environmental Education Act and the creation of numerous environmental education programs. Environmental Law, Environmental Education, Environmental Engineering, and Environmental Economics became areas of professional specialization. Colleges and universities developed courses, majors, and graduate programs concerned with the environment. New professional associations and journals were created. The mass media devoted increasing attention to environmental issues in regular reporting and in special features and programs. Meanwhile, traditional conservation organizations such as the Audubon Society and the National Wildlife Federation grew at an enormous rate while many new national organizations such as the Sierra Club, Friends of the Earth, and the Cousteau Society became prominent. At the local level, Conservation Commissions were established in thousands of communities, and countless preservation groups and environmental action organizations sprang up across the country.

This popular institutionalized success of the environmental movement has had a profound effect upon America. It has transformed how we think about our resources and growth. It has created awareness of issues not imagined two decades ago and has reoriented our economy inasmuch as environmental protection projects now constitute one of its dominant growth sectors. It has led to the education of a cadre of new specialists, and it has created an entirely new political infrastructure that will remain for generations. As one commentator has noted: "Quite aside from these inescapable demands for reform, however, one can only marvel at the degree to which . . . concerns for water, air, noise, ugliness, and natural open spaces have entered the American consciousness, changed ways of living, and motivated the foundations of countless reform organizations - nearly all of this in a fifteen year period."[5] Indeed this is a remarkable change within a relatively brief period of history.

The most distinctive feature of the "third wave" of the conservation movement has been the extent of its success. In the decade between early 1960's and early 1970's, this movement grew from a cause to an accepted set of institutionalized American values.

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In the early 1960's the term "environmental" was seldom used in a popular sense, but by the close of the decade it had become the popular slogan of a powerful movement. Americans became accustomed to hearing about environmentalists, the environmental movement, and environmentalism. By 1970 when the Environmental Protection Agency was created, the President of the United States referred to the 1970's as the Environmental Decade.

Beyond the Charismatic

Despite the success of the environmental movement there are many who are uneasy about it because they feel the character of the movement has changed. In the past few years I have spoken with many leaders of environmental organizations who fear that the environmental movement has lost some of its momentum and vitality. As one leader remarked, "I think the environmental movement may be declining. I just don't see the new leaders. We may have run our course." Other leaders have expressed similar anxiety because of opposition and criticism by opponents of the environmental movement.

While the continued successes of the environmental movement hardly suggest decline, they do suggest change. However, this change does not appear to be engendered by failure as much as by success. What seems to be happening is that the environmental movement is being transformed from a relatively charismatic movement to a more institutionalized movement. It is a movement less and less dominated by charismatic leaders, protest, and dramatic causes as it is a movement less marked by inspirational leaders and more dominated by leaders who manage.

In these respects the environmetnal movement in the 1960's and 1970's reaffirms Max Weber's analysis of how the charismatic is transformed into the routine dimensions of social and political life. As Weber noted in his Theory of Social and Economic Organization, if the charismatic "is not to remain a purely transitory phenomenon . . . it is necessary for the character of charismatic authority to become radically changed. Indeed, in its pure form charismatic authority may be said to exist only in the process of originating. It cannot remain stable, but becomes either traditionalized or rationalized, or a combination of both."[6] Elsewhere, Weber observes: "It is the fate of charisma, whenever it comes into the permanent institutions of community, to give way to powers of tradition or of rational socialization."[7] To Weber such transformation of any popular movement was viewed as inevitable.

Today the environmental movement has become more rationalized and routinized in relation to social institutions. It is now a movement that is essentially accepted and integrated into the mainstream of our cultural life. This is not to suggest that there is still no need for passion, drama, and charisma, but the environmental movement must confront the demands of rational socialization. In this regard it seems that a "fourth wave" of this movement is before us. The environmental movement has been successfully accepted; the new challenge is the management of that success.

New Competencies for Environmental Leadership

If environmental leaders and organizations are to be effective in their new institutionalized role, they need to develop skills of successful institutional leadership. This is as important for national and state environmental groups as it is for local ones. Therefore, the environmental movement must develop a dual consciousness to continue to be successful. There should be as much concern for the institutional capability of environmental organizations as there is for the substance of specific environmental issues. In the future, environmentalists need to be as concerned about the state of leadership of the environmental movement as about the state of the environment.

What areas of institutional capability are needed if environmental organizations and their leaders are to be effective? There are five areas in which environmental groups (or any public interest groups) need to strengthen competency in order to remain effective in the years ahead.

1. The Need for Professional Administration:

Environmental organizations cannot afford the luxury of casual or sloppy management. The rigors of organizational survival in a complex institutional society demand efficient and enlightened administration. As David Cohen, President of Common Cause, has recently said: "To succeed, a public interest group must operate as a modern organization dealing with issues that matter to people, consulting with its members, focusing its constituencies and energies, respecting the professional role of the media by providing them with accurate and useful information and paying attention to administrative management. (Failure to pay attention to administrative management will snuff out all good intentions. The public interest constituency will need its share of MBA's, just as it needed creative lawyers, imaginative researchers, skilled lobbyists, and inventive activists) . . . Professionalism must be a key style of operation for the public-interest constituency."[8] While effective professional management is not a subject that "turns on" environmental leaders it is important that they be "turned on" to it as the quality of management will have a great deal to do with the advancement of environmental groups.

Professional administrative capabilities that particularly need to be fostered among environmental organizations include the ability to undertake moderate and long-range planning, fund raising, financial planning and cost control, program evaluation, effective personnel practices, and management information systems. The limited financial resources available to environmental groups require these skills for responsible stewardship; and the need for public trust calls for respected professional management.

Undoubtedly some environmental leaders will fear that attention to professional administration may lead to bureaucratic excess in the environmental movement. Although this is an ever present danger, it is not an inevitability. To avoid a cult of bureaucracy in the future, environmental organizations must be guided by values of humanistic management as well as efficiency. Therefore, environmental leaders who are recruited and trained should be as capable of working effectively with people as they are at handling administrative detail.

2. The Necessity of Collaboration:

A dominant characteristic of modern organizational life is interaction among organizations. "Modern society," comments Amitai Etzioni, "has found it necessary to build more and more instruments to regulate this interaction to encourage increase not only in the effectiveness and satisfaction within each one but also of the relations among them." This need for meaningful and cooperative relations among organizations is greater today that ever before, whether it be in the marketplace, government, or the voluntary sector. It is particularly critical for environmental organization and sociopolitical goals.

Collaboration in the environmental movement must take place among environmental groups (intra-movement collaboration) and with other groups that may share some common values (inter-movement collaboration). Even a cursory review of the successes of the environmental movement gives evidence of the importance of both kinds of collaboration. Despite many instances of successful collaboration in the past, the present extent of this cooperation is not sufficient to sustain the success of the environmental movement in the future.

At an inter-movement level this lack of sufficient coalition building has become more evident in the past few years. Congressman Morris Udall has noted that "Part of the reason the environmental movement finds itself in trouble today is that we failed during the heady years of the 60's to make friends and forge alliances with groups that might be largely with us now: blue collar America, enlightened industry, the minorities who inhabit our rundown cities. But in those days, environmentalists were not in a mood to compromise or to play a role in 'their' issues, and we predictably find few friends around to sustain us during the dark days of the energy crisis."[10]

In the years ahead the environmental movement will have to continuously form alliances if it is to succeed. Accordingly, environmental leaders will have to develop appropriate attitudes and skills for coalition building. It will also be necessary to develop skills for permanent collaboration among environmental leaders and groups. Furthermore, these leaders will need effective skills in human relations and organizational development. They will have to design imaginative ways of sharing organizational resources. They will have to learn to build and sustain trust as they modify their organizational agendas to avoid duplication and unnecessary competition. They will have to learn how to ask for and receive help while learning how to give help. And above all, they will have to be able to create cooperative organizational systems in order to make collaboration a permanent rather than an occasional feature of their organizational functioning.

In order to foster collaboration among environmental groups, new types of organizational arrangements must be developed. For example, coalition organizations are needed at the local, state, and national level to encourage joint planning among groups. Cooperative programs need to be established among groups in each state and region of the country to provide effective training opportunities for staff and volunteers. And joint efforts will be needed to identify and make available technical information and resource persons to environmental groups. Although creating these kinds of collaborative enterprises is difficult, it is absolutely essential in order to meet the emerging needs of the environmental movement.

3. The Importance of Political Action Skills:

Some years ago John Gardner wrote: "Effective steps to save the environment will require a highly expert knowledge of government machinery, a knowledge of political infighting, a knowledge of how tough and enforceable legislation must be written . . . These are subjects that well-intentioned Americans have stubbornly avoided, and by doing so they have all too often condemned themselves to failure in the battle to save the environment."[11] If future failures are to be minimized, environmental leaders, at all levels, need to develop these areas of political knowledge and skill. There are three skills areas in particular that will grow in importance in the years ahead: drafting legislation, lobbying, and participating in government-sponsored citizen-involvement programs.

Drafting Legislation: At the federal, state, and local level, environmental leaders should be informed about the process of drafting legislation and how they can initiate, assist, and influence this process. More specifically, environmental leaders need to be able to draft legislation and ordinances and work with appropriate legislative committees and their staff. It is also important that they understand how to track the development of a piece of legislation in order to be able to support it.

A recent study of 1,150 environmental leaders in New England indicated a priority interest in developing these skills. This suggests a growing confidence among environmental leaders in the power of legislation as a tool for environmental protection. It also indicates increased interest among environmentalists in being more pro-active than reactive by creating adequate laws to support their concerns.

Lobbying: While lobbying has always been an important political action skill, the growth in the number of special interest and public interest lobbying efforts is changing the lobbying environment. Therefore, lobbying is becoming a very sophisticated art that requires considerable research and planning. Further, awareness of the nature and extent of lobbying permitted for environmental organizations which have tax exempt status under section 501-C-3 of the Internal Revenue Code needs to be clearly understood.

To remain effective, environmentalists must be concerned about the quality and the quantity of their lobbying capability in light of the enormous growth in the lobbying efforts of business and industry. As an example of this growth, one need only consider the rapid increase in federally registered Political Action Committees (PAC's). Between 1974 and 1977 the number of these groups grew from 608 to 1298; whereas there were only 80 corporate groups in 1974, there were 538 in 1977.[12] This represents a 509% growth rate in corporate PAC's. Further, environmentalists should be concerned about the substantial increase of business and professional groups as contributors to political candidates. For example, in 1974 these groups gave a total of 4.8 million dollars to Congressional candidates, but in the 1976 Congressional election the amount increased to 11.6 million, a 142% increase in two years.[13] The recent U.S. Supreme Court Decision in the case of the First National Bank of Boston vs. Bellotti, which allows business broad latitude in making political expenditures and lobbying, will undoubtedly further encourage the growth in lobbying and political contributions by the corporate community. This means that environmentalists will have to increase the extent and the quality of their lobbying efforts to keep pace with the enormous increase in lobbying from private sector interests.

Citizen Involvement: A major change in democratic practice in America in the past twenty years is the dramatic increase in citizen participation efforts by government agencies.[14] As administrative agencies of government have increased their discretionary decision-making power, efforts to inform and involve citizens in agency decision-making have become widespread. One recent study by the Community Services Administration catalogues hundreds of citizen participation requirements and programs among federal agencies.[15] Another study has indicated over 100 citizen participation requirements in one state and estimated that as much as 50 to 100 million dollars may be spent annually in that state among state agencies for citizen participation efforts.[16]

Although there is legitimate concern about the questionable quality of many citizen involvement efforts, it is clear that citizen involvement programs are here to stay and will provide important forums in which environmental groups should be involved. In order to participate effectively in these activities, it will be necessary for environmental leaders to develop a number of citizen involvement skills. Not among the least of these will be remaining informed of citizen involvement opportunities at various levels of government, learning how to place capable representatives on advisory committees, preparing and delivering thoughtful testimony at public hearings, participating in shaping the rules for citizen participation in various government agencies, preparing enlightened written commentary, and monitoring citizen participation programs to assure that the rules of the game are not violated and that citizen contributions are genuinely considered.

4. The Capacity for Scientific and Technological Assessment:

Nearly a decade ago in his optimistic assessment of the potential relation between man and technology, Victor Ferkis extolled the notion of a new model of "technological man." "Technological man," he offered, "will be man at home with science and technology, for he will dominate them rather than be dominated by them."[17] Unfortunately, the day of technological man is still far off because man seems hardly at home with or dominant master over science and technology.

It has been and will continue to be a principal mission of the environmental movement to assess the impact of science and technology on man and the biosphere. Because of the number and complexity of scientific issues and the rate of technological change, this is clearly an enormous challenge that environmental groups and organizations cannot meet by themselves. Further, it is unrealistic to expect any environmental group to be able to develop competency in more than a few areas of environmental concern. Therefore, it is important that environmental organizations develop imaginative organizational procedures for assuring adequate scientific and technological assessment.

To assure adequate and technological assessment, environmental organizations should develop capability in at least three areas: first, they will have to work closely with scientists and government to shape research and investigatory agendas concerning environmental issues. Second, environmental groups will need to collaborate in establishing a division of labor in regard to specific issues. To deal with issues in sufficient depth, different groups will have to specialize in one or several particular areas. Third, environmental leaders will have to know how to manage efforts of scientific and technological assessment in areas in which they have little or no technical training. This will require knowledge of and means of obtaining technical and scientific resources. Skill in attracting and assembling competent technicians and scientists as well as dedicated citizens willing to study and learn (particularly on a voluntary basis) will also be needed. And it will require the ability to organize and help professionals and laymen work together in the assessment of scientific and technical matters.

5. The Demand for a New Educational Orientation:

H. G. Wells once commented that "human history becomes more and more a race between education and catastrophe." In the past 15 years, the environmental movement has played a critical role in this race by increasing public awareness of catastrophic threats to our environment. In retrospect, it is clear that the educational impact of this movement has been monumental. In future prospect, it is clear that this educational impact must continue.

However, environmentalists should anticipate new tensions and demands in their public education role. In recent years, the environmental movement has been under increasing attack by critics as being essentially negative and obstructionist. In some instances these charges have been well founded, and in others they have been mere propaganda. Nonetheless, these views are instructive to the future educational demands upon an institutionalized environmental movement. Basically this suggests that the environmental movement must be as concerned with advocating realistic and positive solutions to environemtnal problems as in warning about environmental hazards. This means that environmentalists will have to gear education efforts toward constructive discovery and advocacy as well as toward dedicated opposition. Without the former, the credibility of the latter will be minimized.

In this regard, environmental leaders will have to address issues of economic development from a balanced and well informed perspective. This will require knowledge of economics and the ability to address critical issues with business and labor leaders in a constructive and realistic manner. A recent study of over 1,100 environmental leaders in New England indicates a substantial interest in this area. For example, in rating 42 issues, Economics of Natural Resources Protection (69%), Economic Development and the Environment (58%), and Jobs and the Environment (52%) were rated as the first, fifth, and thirteenth issues of greatest priority among a majority of respondents.[18]

Expanding the educational focus of the environmental movement will not be an easy task and many environmentalists may fall into the easy trap of adversary isolation. It is easier to be in opposition. It is easier to attract people to fight than to solve problems. It is easier to frighten than to enlighten. It is easier to arouse anger than dedication.

Hopefully, environmental leaders of the future will not take the easy way out. Hopefully, they will develop attitudes and skills to be constructive partners as well as tough opponents. Hopefully, they will be able to cooperate, create viable alternatives, and compromise when it is prudent. Hopefully, they will possess the human capacity to try to work with those with whom they most disagree.

The Environmental Movement in 1985 and 2000

What the environmental movement will be like in 1985 and 2000 in uncertain. However, I suspect it will be highly diverse and decentralized, but much more strongly coordinated. Most likely it will be more institutionalized, although spontaneous protest movements will continue. It may well be that at least half of the issues with which environmentalists will be concerned in the year 2000 are things we hardly imagine today and that the environmental movement will provide some of the most exciting career opportunities for the next generation. And I imagine that those who are committed to environmental values will constitute a major political force.

Above all, the environmental movement will probably be even more integrated into our social attitudes and institutions in the future. It is very likely that for the remainder of this century, issues of planning and political decision making will be as dominant as issues of technological development have been since World War II and that anticipation and evaluation of environmental factors will be paramount. Further, I suspect that the tensions between economic development and environmental concern will be reduced and managed more effectively.

While this may bode well for the future of the environmental movement, it cannot happen unless new environmental leaders develop new competencies. While the third wave of the conservation movement has broken, the fourth wave now swells.

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SOIL AND WATER RESOURCES CONSERVATION ACT - RELATIONSHIPS TO GEOGRAPHIC EDUCATION*

Thomas W. Levermann

A template for using a federal law as a teaching device is provided in this paper prepared by a staff member of the U.S. Soil Conservation Service. In this particular case, the Soil and Water Resources Conservation Act (RCA) of 1977 is the topic at issue, and thoughts as to how it might be used in the context of geographic education are presented.

I'd like to share with you one of the most exciting and important events in the future of U.S. agriculture and natural resources conservation. Every citizen, rural or urban, will be affected by the Soil and Water Resources Conservation Act of 1977. For the sake of brevity and in the best bureaucratic tradition, I'll abbreviate that rather ponderous title to simply, RCA . . . standing for Resources Conservation Act. A bit later I'll give you a few thoughts on how you can use RCA in your classes. First though allow me to discuss the law and RCA process.

Public Law 95-192

In 1977, Congress passed Public Law 95-192, RCA. Under this law, the U.S. Department of Agriculture (USDA) will (1) appraise the Nation's nonfederal soil, water, and related resources; (2) evaluate the effectiveness of ongoing conservation programs; and (3) develop a comprehensive program or strategy to guide future conservation efforts.

What is being done to fullfill the requirements of the Act? The four major activities are: First: Development and publication of four RCA documents. Second: An active program of public participation. Third: An evaluation of public attitudes about the RCA process and, in particular, the contents of the documents. And fourth: The President's recommendation to Congress of his proposed soil and water conservation program.

Overall RCA guidance is supplied by an interagency coordinating committee, composed of representatives of nine USDA agencies, the Office of Management and Budget (OMB), and the Council on Environmental Quality (CEQ). Program leadership has been assigned to the Soil Conservation Service (SCS), with the continuing input of representatives of all coordinating committee agencies and other Federal and nonfederal agencies, organizations, individuals, and consultants.

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*Paper presented at the annual meeting of the National Council for Geographic Education, Mexico City, November 2, 1979. (ED 183 475).

Documents

The Act requires USDA to appraise the Nation's nonfederal soil, water and related resources. Related resources refer to wetlands, riparian vegetation, fish and wildlife habitat, windbreaks, and organic residue.

The appraisal of the resources is found in two draft documents. The first one, appropriately titled Draft Appraisal--Part 1, and made public September 4, 1979, includes information on the quality and quantity of the resources and is packed with statistical data on land capability, current conditions, and major uses of nonfederal land. It also contains an inventory of legislation and regulations dealing with resources and discusses the impact of technology on agricultural production and conservation. A most fascinating section of Part 1 is a condensed history of American agriculture and conservation.

To give you some flavor of the information found in Part 1, here are just a few items:

...41% of the nonfederal land (614 million acres) consists of soils suitable for cultivated crops and other uses such as pastureland, woodlands, and urbanized lands;

...the nonfederal forest industry is, at present, producing at 68% of its biological potential;

...we've been losing 2 million acres of cropland annually since 1958 to uses other than agriculture;

...and we've been losing 500,000 acres of fish and wildlife habitat annually since 1958.

The second RCA draft document, Appraisal--Part 2, will present the projected demands on the Nation's nonfederal resources to the year 2030. In Part 2, a major portion of the document will describe the inherent capabilities and limitations of our resources in responding to projected demands. It will also suggest various levels of management that could be used to preserve our resources, provide data on trends in rural land ownership, and describe the contributions of state and local programs to soil and water conservation.

In the third RCA document, three to five "alternative" soil and water conservation programs will be outlined to meet the future needs of the Nation. Each alternative will be a relatively complete package of actions and activities that could be undertaken by USDA to meet specific soil and water conservation objectives.

Here is a general description of some of the ideas considered in developing the alternatives:

(1) The major conservation problems appear to be greater in some regions than others, suggesting programs targeting these problem areas. This alternative means that we must not only target problem regions but also specific acreages within regions and counties.

(2) USDA is studying the use of various forms of program cross compliance. A basic form of cross compliance would be to make implementation of a Soil Conservation Service conservation farm plan a basic condition for assistance under production adjustment and other USDA programs.

(3) We are also considering what the proper mix for federal, state, and local responsibility in conservation should be. This comes largely as a result of the substantial contributions of nonfederal units of government to soil and water conservation.

(4) Another alternative being evaluated includes some form of regulation. On this matter, we are weighing potential solutions to conservation problems against the problems themselves. Those solutions that are more severe than the problems they are supposed to solve, either in terms of loss of freedom, higher costs, or administrative problems, do not appear attractive.

In the draft program document, we will present the alternative programs and their economic, social, and environmental effects for public review and comment.

The fourth and final RCA draft document is to be a summary of the three draft documents. This is the document that we think will be most useful and understandable for laymen.

Copies of all RCA draft documents are or will be available for public review in early 1980 at your local Agricultural Stabilization and Conservation Service (ASCS) and/or Soil Conservation Service (SCS) Offices.

Public Participation

The law mandates that the public be involved in RCA. The primary public participation activity is a 60-day public review period. During the review period 18 regional meetings will be conducted by Washington based teams. The purpose of the meetings is to inform the public about RCA and provide them an opportunity to comment about the process. Also during the public review period, citizens, organizations, and agencies will have opportunity to respond to any aspect of the RCA process including the contents of the draft documents. All written comments received during the review period will be sent to a special temporary office in Athens, Georgia, which will analyze public comments received during the RCA process.

The results of the analysis will be forwarded to Washington for the interagency coordinating committee's use in developing a recommended soil and water conservation program. The Secretary of Agriculture will then confer with the President, who will send his recommended conservation program to Congress. That, in essence, is the RCA process for 1979-80. And, we have to repeat it again in 1985 since the law requires a 5-year update.

What Does All This Mean to the Geographic Educator?

What is the main deterrent to solving our conservation problems? Certainly it hasn't been the availability of technical solutions. Natural Resource conservation techniques have been known and practiced for years. The real problem seems to be the lack of knowledge citizens have regarding conservation of natural resources. Paul Sears, in his 1947 book, Deserts on the March, said:

> "Science has the power to illuminate, but not to solve, the deeper problems of mankind. For always, after knowledge come choice and action, both of them intensely personal and individual."

A 1936 report of the Great Plains Commission stated:

> "No constructive conservation program can be developed without changing the motivating attitudes and habits and redirecting the efforts . . . of citizens . . . In a democracy, education is more fundamental even than legislation as a force directing rational progress. It is the basis of wise legislation."

And a 1979 report by the USDA Land and Water Conservation Task Force identified lack of education and apathy as factors most frequently perceived as limiting the application of many soil and water conservation practices.

It appears that without strong educational involvement, the long-term objectives of a national soil and water conservation program might not be achieved. Education is required not only to stimulate individuals and groups to apply conservation practices but is necessary in order for the citizen to participate in the social and economic decisions required for the rational use of our natural resources.

Geography is the thread that binds you and me together through our diversity of academic interest and pursuits. I suspect our interest in specialized areas of geography grew out of an overriding interest in the earth and the mysteries it holds. These interests, combined with the fundamental knowledge of environmental principles you possess, make geographic educators a prime academic group to participate in the RCA process.

By now, I hope you've been stimulated to realize the potential of RCA and ways you can adapt all or parts of it to your classroom. But I would like to share just a few ideas on how you can use and participate in RCA in the coming months.

First: as you review the draft documents, you will realize there is a wealth of information that can and should be used in your class activities. The information in the appraisal documents presents the most up-to-date picture of America's natural resources. The availability of the RCA documents offers the educator and the student ready reference materials and a futuristic view of conservation programs and their impact on society. I want to caution you, though, the first group of RCA documents are draft copies. You may find errors, possible omissions of items you think should be included, and so on. This is to be expected and leads me into the second way RCA and you can come together.

Second: you and your students can participate in the RCA process by reviewing and analyzing the documents. In fact any part of the RCA process can be commented on, so, if one of your students has an idea about some aspect of RCA other than the process or document contents, encourage them to communicate their feelings to us.

Third: although we desire that all citizens participate, I have a special wish to have high school students become active in the RCA process. By the time they graduate, they are either voters or near voting age. Participating in RCA will help high school students make a real contribution to their own personal future by having a voice in shaping development of a national policy. A fundamental right of every citizen is participation in the democratic process, and RCA is one of many opportunities citizens will have to exercise that right in the coming years.

Fourth: the RCA process could be used as a model for in-class or in-school activities illustrating how citizens have a voice in their government. Since the basic topic of RCA is natural resources and their impact on society, geographers could be leaders in formulating curriculums that could develop a resource inventory of the school site or even the community. To accomplish that, the procedures of writing, passing, and implementing laws could be followed.

In line with that, idea number five: RCA provides students an opportunity to study the implementation process of an Act, beginning with its historic and political history, its route to passage through Congress, and the procedures followed to carry out or meet the Act's requirements.

Conclusion

It's logical that formal education be a part of closing the gap between the level of public understanding of natural resource conservation and the knowledge necessary for making effective conservation decisions. Without developing the individual's environmental awareness and knowledge, we, as a society, will not achieve such goals as reducing the rate of soil loss, improving water quality and reducing pollution, increasing the ratio of caloric output to input in food and fiber production, and maintaining optimal long-term productivity of our land and water resources.

If those goals are something that you as a citizen and educator can subscribe to, then, in both processes and intent, the Soil and Water Resources Conservation Act of 1977 provides an opportunity for meaningful educational experiences for your students.

The end result of educational involvement in RCA is that citizens will be more knowledgeable of RCA and the role agriculture and natural resource conservation has in their lives, whether they actually harvest the products of the soil or just reap the benefits.

Thank you.

THE SUITABILITY OF THE ENVIRONMENTAL ISSUES SERIES FOR THE GRADE XI BIOLOGY CLASSROOM*

Barry A. Mitschke

Responding to a recommendation that educators incorporate and integrate an "environmental emphasis" into existing courses and programs, and coupling this with an opportunity provided by Environment Saskatchewan to develop case studies for a Saskatchewan Environmental Issues Series (EIS), a group of secondary school biology teachers in Regina participated in a quasi-experimental research program to implement and test an environmental simulation (role-play) exercise. The report below was submitted to the Saskatchewan School Trustees Association Research Centre following completion of the study.

Purpose of the Study

In 1973 the Saskatchewan Department of Education Advisory Committee on Environmental Education recommended that:

(a) educators incorporate and integrate an "environmental emphasis" into existing courses and programs and

(b) special courses and mini-courses have a definite role in fostering environmental knowledge and environmental awareness.

Also in 1973, the Director of the Public Information and Education Branch of Environment Saskatchewan hired several teachers to write four case studies for a Saskatchewan Environmental Issues Series (EIS). Within each case study, students, using a simulation process, assume the roles of people who are seeking to solve a complex environmental issue. Using problem-solving techniques, the students have to resolve the issue and come to a compromise decision.

There was a need to formally evaluate a case study, to find support for the Advisory Committee's recommendations, to involve teachers and students in educational research, and to promote the aims of environmental education. The Wetlands Management case study was chosen for the investigation.

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*S.S.T.A. Research Centre Report No. 50. Regina, Saskatchewan: The Research Centre, Saskatchewan School Trustees Association, April 1978. (ED 180 759).

The investigation was guided by five sub-problems:

1. to determine the suitability of the materials,
2. to assess the appropriateness of the simulation strategy,
3. to measure the effects of the Mini-Course on the students'
   (a) environmental knowledge
   (b) environmental attitude and
   (c) critical thinking ability,
4. to gather teacher and student opinions about the experience, and
5. to analyze some of the classroom situation and verbal interactions.

Procedures and Samples Used

Nine teachers from seven Regina-area high schools with their 413 grade XI biology students in 17 classes volunteered for the investigation. A quasi-experimental nonequivalent control group design and a curriculum evaluation model guided the investigation and particularly the administration of instruments for data collection. See Table 1 for details.

The teachers were randomly assigned to Treatment Groups. Quantitative data collection instruments used were the Environmental Attitude Inventory (EAI), Environmental Science Test (EST), and Cornell Critical Thinking Test (CCTT), plus the CVC (CERLI Verbal Classification) system tapes used by the STF in the Teaching-Learning Conditions Project. Other instruments were investigator designed.

Student performance data from the EAI, EST and CCTT were analyzed using the Statistical Package for the Social Sciences (SPSS) computer programs dealing with description, correlation and the analysis of covariance. STF teacher-raters analyzed the CVC tapes, and the investigator analyzed all remaining data.

Major Findings

A number of key criteria had been set before the investigation in order to judge the effect of the Mini-Course. Table 2 enumerates these criteria and summarizes the major findings of the investigation specifying how well the criteria were met.

Conclusions

The materials of the Mini-Course were judged as suitable for the Grade XI biology classrooms. This suitability would be increased if the few gaps in information were filled, and if the visual difficulties with the map and slides were corrected. It is suggested that some of the student problems with the materials were not caused by the materials themselves, but could be attributed to student weaknesses in research skills, namely, extracting, interpreting, organizing and summarizing data for their roles. Similarly, it is suggested that some of the teachers' frustrations with the students were caused by the "newness" of the materials and strategy, and by the fact that the teachers had no background experience (other than the Orientation Workshop) to help them solve student problems and to find supplementary material or information. The relevancy of and motivation provided by a Saskatchewan environmental issue was evident.

The simulation strategy was judged as appropriate for the grade XI biology classrooms. It is suggested that because the students were so actively involved and having fun, their learning was enhanced, and enjoyable, and they welcomed the change from "regular" classes. Even though the criterion tests found no changes in environmental attitude, environmental knowledge and critical thinking ability because of the Mini-Course, many other types of incidental learnings and experiences were exhibited and suggested by the participants. Among these learnings and experiences were: an increased awareness of the complexity of an environmental issue; more self-confidence; a chance to practice social and communication skills--cooperating, persuading, making a decision, problem solving, critical thinking, writing and presenting briefs; consideration of and exposure to differing viewpoints; and playing a different role in the Mini-Course, hence in the classroom. It is suggested that the "newness" of the strategy caused teachers to have problems with the logistics (timing and scheduling) of the Mini-Course which should be solved with more experience with the strategy. Furthermore, it is suggested that the need to motivate all students to participate is inherent in every teaching strategy, not just a simulation. The simulation strategy in considered to be a worthwhile addition to a teacher's repertoire of strategies.

Based on teacher feedback, it appears that the Mini-Course can be successfully integrated into the biology courses. This integration--backed by the judged suitability of materials and appropriateness of simulation--fulfills the Advisory Committee's recommendation that educators incorporate and integrate environmental education materials into existing courses.

No statistical support can be given to the Saskatchewan Advisory Committee on Environmental Education recommendation that special courses or "mini-courses" have a definite role to play in fostering environmental knowledge and environmental awareness. The Mini-Course did not cause any significant differences in the students' environmental attitude, environmental knowledge and critical thinking ability over 10 hours of classroom activity as compared to the "regular" biology classes. In relation to this recommendation, the Mini-Course maintained a level of student knowledge and awareness but did not foster an increase. In addition, it can be concluded that students' sex or rural-urban location had no significant effect on these variables. The significant links between environmental knowledge and critical thinking ability, although not cause-effect, suggest that environmental simulations would be valuable additions to environmental education curricula, such as environmental biology. Agreements and disagreements between the current findings and previous research were found for these student performance variables.

The *Mini-Course* experience, in general, was considered worthwhile for the participants. The students learned actively and had fun doing it. Classroom perceptions of others were enhanced. Social interactions and communication skills were practiced. The in-service Orientation Workshop for teachers adequately met their needs for easier involvement. The majority of the AIMS and OBJECTIVES were achieved. All six teachers would use the *Mini-Course* again. However, all of the evaluation (testing and forms) demanded by the investigator, which were not part of the *Mini-Course*, was deemed a necessary "evil" by the participants and was the least enjoyable experience of the investigation.

As an hypothesis, the investigator suggests that a more important reason than a teacher's experience for differences found between classroom situations is the situation itself--facilities, resources and students present. The most inexperienced teacher in the investigation was just as, if not more so, eager, enthusiastic, environmentally aware and willing to take a risk as were the experienced teachers, even though the "polish" and logistical abilities were not as good. The situation of the least experienced teacher was rated and observed to be the least conducive to learning: facilities were poor; resources were deficient; and many students were apathetic.

Visitations by the investigator-consultant were considered to have little impact on the participants of Treatment Group A. The investigator suggests that a more important impact on the teacher was caused by the in-service Orientation Workshop and that a more important impact on all participants was caused by the methodological orientation provided by the *Mini-Course* materials and simulation strategy. The investigator's visitations did serve the function of gathering some "naturalistic" observations.

Another conclusion relates to classroom interactions. The results obtained from the audio-taping of random "regular" biology classes and random *Mini-Course* classes support the suggestion that the methodological orientation of the *Mini-Course* materials and simulation strategy caused a shift in student-teacher roles. Teachers talked less, had fewer interactions per minute, dealt less with facts, informed more and rejected students less during the *Mini-Course*; students did the reverse. All of these role changes, except informing more, are indicative of *indirect* influence which should lead to increased student participation and the learning of attitudes and knowledge.

Implications for Further Research

Based on the investigation happenings, feedback, results and conclusions, 22 questions were specified which may be answered by further research. For convenience, these 22 questions were grouped as follows: classroom interactions; curriculum; environmental education; general; simulation; student behaviour; teacher behaviour; teaching strategies; and thinking ability.

Recommendations for Practice

In view of the results and conclusions of the investigation, the following recommendations are in order, especially those that apply to the teachers and schools involved.

1. Problems with the Mini-Course materials should be corrected or supplements should be provided to make the Mini-Course materials even more suitable than at present.

2. All the EIS case studies, which are built on the identical model as that of the Mini-Course, should be made available with the Department of Education assuming this responsibility.

3. Teachers should be encouraged to use the Mini-Course in future years with their grade XI biology classes.

4. Teachers should be encouraged to use the EIS Mercury Pollution, Pesticides, and Qu'Appelle Basin case studies in their biology courses.

5. Other case studies should be written on other relevant Saskatchewan environmental issues using the model employed for the first four case studies. The Department of Education, together with other interested institutions, should show leadership by spearheading this development.

6. The suitability of the EIS case studies should be assessed in other subject areas, for example, chemistry, physics, geography and home economics.

7. Because the simulation strategy has been judged appropriate, biology teachers should strive to use the simulation strategy at least once per year to gain more skill in its use.

8. Teachers should try to develop environmental knowledge, environmental attitude and critical thinking tests which would more adequately measure these dimensions deemed learnable in the EIS case studies.

9. Teachers should be encouraged to become involved with the STF teaching-learning conditions project. By audio-taping their classes and applying the feedback, teachers should be able to change their verbal behaviours toward those dimensions of indirect influence considered worthwhile and established by research.

10. Teachers should continue to take the risk of involvement in participatory educational research, in-service, and other professional development activities so that they and their students may remain current, enjoy variety, and share experiences and feedback as they learn and grow together.

TABLE 1

Design of the Investigation and Data Collection Instruments[a]

Treatment Groups	Aspects of the Design					
	Treatment and Data Collection			Other Data Collection		
	Orientation Workshop	Wetlands Management Mini-course	Investigator's Visitations	Teacher Data	Student Data	Evaluation Workshops
A	6-7; 14[a]	11	12	8; 13(4)	1-5	9-10
B	6-7; 14	11	none	8; 13(4)	1-5	9-10
C	none	none	none	7-8; 13(2)	1-5	none

[a] Arabic numbers refer to the KEY below.

KEY Data Collection Instruments:

1. Environmental Attitude Inventory (EAI)
2. Environmental Science Test (EST)
3. Cornell Critical Thinking Test (CCTT)
4. Student Answer Sheet
   (a) Sex (b) Rural-Urban
5. Student IQ Data
6. Evaluation of Orientation Workshop
7. Teacher Profile
8. Timing and Coverage
9. Teacher Post-Investigation Interview
10. Teacher Feedback Opinionnaire
11. Student Feedback
12. Investigator's Notes
13. CVC Tapes (Number)
14. Case Study Consent Form

TABLE 2

Effects of the Investigation: Major Findings (Criteria Met)

CRITERIA	
SET	MET
SUITABILITY OF MATERIALS	
1. Less than 6 major categories of problems would be encountered e.g. vocabulary; interpretation of tables.	1. 5 categories were encountered.
2. 2/3 AIMS and OBJECTIVES achieved.	2. 5/6 AIMS and 2/3 OBJECTIVES achieved.
3. To study a Saskatchewan environmental issue--chosen as an important AIM.	3. This AIM was ranked third of six.
4. "Regular" students would not outperform Mini-Course (the experimental) students.	4. True
APPROPRIATENESS OF SIMULATION	
1. The advantages would outweigh the disadvantages.	1. On a teacher checklist, the 9 advantages received 44 checks; the 8 disadvantages received 12 checks.
2. 75% of the student comments would be favourable.	2. 93% were favourable.
3. Less than 6 major categories of problems.	3. 5 categories encountered.
4. Participants would enjoy the "involvement."	4. Enjoyment was expressed.
OTHER EFFECTS OF THE TREATMENT	
1. 2/3 of the teachers would judge the Orientation Workshop as adequate and useful.	1. 2/3 or greater.
2. 65% of the student comments would be favourable.	2. 84% were favourable.
3. All 6 teachers would use the Mini-Course.	3. All 6 specified this.
4. Teachers would become more indirect.	4. Teachers (a) dealt with facts and (b) rejected students less, which indicated indirectness.
5. Students have more interactions per minute.	5. Approximately 4x as many.
6. Teachers and students would reverse roles on CVC dimensions.	6. Roles were reversed on three dimensions (a) dealing with facts, (b) informing, and (c) rejecting.
7. Workshop benefits would be expressed.	7. Seven benefits were stated.
8. Students perceived changes in classmates and teachers.	8. True.
9. Teachers perceived self-change.	9. True.

AN APPROACH TO INSERVICE EDUCATION TO PROMOTE OUTDOOR EDUCATION AS A TEACHING METHOD IN THE ELEMENTARY SCHOOL[*]

J. Thomas Morrisey

This paper outlines an approach to in-service education that is based on the involvement of principals and teachers as prime agents of change. Through the use of principals and teachers as instructors in teaching other teachers, it is hoped that there will be less resistance to change.

The use of outdoor education as a teaching method that encourages the integration of all curricular material should make it easier to include more than just the "basics" in the regular school day. Providing teachers and principals with the necessary theoretical knowledge and skills for classroom practice should remove inhibitions on the use of the outdoors. Another important aspect of in-service addressed is that of in-the-classroom support for teachers who are attempting to adopt a new teaching style.

The main thrust of this program is to have the principals and teachers in elementary schools willing and capable of using outdoor education as a way to teach the present elementary school curriculum. The accomplishment of this goal will at the same time increase the science and social studies content of the elementary school curriculum and make for more opportunities to apply the mathematics presently taught.

The goal mentioned above could be achieved through the use of in-service workshops run for a three-week period in the summer break with follow-up, short-time workshops held during the school year. There should also be an attempt made to have personnel available as needed during the first two years the elementary schools are initiating the outdoor education approach to teaching. The workshops would be for all the elementary school personnel, supervisors (where they exist), principals, vice-principals, classroom teachers, and specialist teachers.

A search of the literature on elementary science; reading National Science Funded research reports; and, talking to science educators and elementary school teachers soon revealed that elementary science really never has been treated as a subject with any great importance by elementary schools. There have been some excellent elementary science curricula proposed throughout the last one hundred years, but those curricula have never been fully implemented as the elementary teacher has not had nor is presently being given an education that would prepare them to teach science. This author has studied and worked in the areas of environmental education and outdoor education to upgrade his own proficiency and understanding of how these programs could be used to enhance the teaching (and learning) of science at the elementary school level.

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[*] *1979; ED 214 740.*

As has been mentioned, elementary school teachers usually have an extremely weak or non-existent background in science. While this condition exists there is not much hope of ever getting a good science program started in the elementary schools. Many of the science methods courses given to the elementary teachers have been attempts to acquaint them with the various programs available. All of these programs either play down the need for the teacher to have any science background or attempt to provide the bare minimum of science content so that the teacher can try to teach the program. The present programs in most colleges of education do not require a science background of nor try to provide a science background for elementary pre-service teachers. The present back to the basics movement (reading, writing and mathematics) with all the other areas regarded as extras, has effectively blocked arguments to include science as a separate subject, on an equal footing, in the elementary school. Given all these negatives, it seems only reasonable to assume that the best way to obtain the proper place and emphasis for science in the elementary school is to promote an integrative, methodological approach. Outdoor education as a method of teaching the "three R's" should help to achieve that end.

Much of the literature published in in-service workshops for teachers speaks to the one-shot, three-to-ten-day type. Some workshops are a full academic semester or a three week summer institute. Most of the follow-up consists of a pre- and post-test using attitude scales or opinionnaires. Nothing could be found in the literature that consisted of at least a three week session with in-classroom help for the teacher plus at least one more three week session.

The literature does support the use of the elementary school principal as a positive element in influencing elementary teachers about a teaching method or a syllabus. Sloan (1972) investigated the perceptions held by principals and teachers on certain aspects of the adoption process involved in innovation and change in elementary schools' programs. It was revealed that the principals viewed themselves as the most important factor in proposing and adopting new programs. Principals viewed the teachers as the second most influential element in the proposal and adoption of a new program. The teachers viewed themselves and their principals as the most important program proposers and primary sources of influence in the adoption of new programs. Principals viewed pre-service training for new programs as adequate, but in-service training was considered to be less effective. However, teachers viewed both pre-service and in-service training for new programs as inadequate. Hellweg (1973) investigated how elementary school principals, in traditional schools as compared to principals in innovative schools, perceived their roles. The results of this study revealed that there was more cooperation between the principals and teachers of innovative schools than those of traditional schools. Another conclusion was that the principals of traditional schools viewed their roles as one of maintaining present practices while the innovative principals viewed their roles primarily as ones of change. Sarason (1974) also reached the same conclusions in a similar study.

An article by Heichberger (1975) supported the view that the elementary principal is the most important element in any change that takes place in an elementary school. Elementary teachers perceive their principal as the person who established the need for program change or for maintenance of the "status quo." When elementary teachers actually perceive their principals as change-oriented and when the teachers were involved in planning for change, they participated more readily in the change and considered their principals more trustworthy (Walter, 1978). Through the use of the Professional Interpersonal Interaction System Model (PIIS), Morrone (1979) found that the teachers and principals of elementary schools viewed their roles as complementary.

It would be important to prepare the principals and teachers to become workshop personnel and become involved in teaching their own colleagues. The reasoning is that elementary teachers know best what the major problems are that are encountered during the implementation of any methodological and/or program innovations. Also, through the use of elementary teachers teaching in the school district, it should be easier to change teachers' attitudes toward the innovation. Articles by Evans (1979) and by Bailey and James (1978) support that contention. It is imperative to involve the people you wish to change at all levels of the change process. This means that elementary school personnel should be involved in the decision to change, the change that is to be adopted, the in-service program to be used in accomplishing the adoption, and the actual implementation itself.

The only strong negative or restraining forces acting against the use of outdoor education as a method of teaching are the teachers' lack of theoretical background and skills and their feeling that they don't want to make the change. There is general agreement that something is needed to improve the education in the elementary schools. Some believe that a move back to the basics will improve the quality, but many feel such a move is just a retrenchment of the old curriculum which does not include the "frills" of science, social studies, physical education, art, and music--except when there is time.

Those principals academically qualified, judged competent and interested would be used where possible to help in the teaching of subsequent courses to the teachers. The principals, all of them, would be expected to prepare the teachers for the three week summer session and to serve as the resident consultant, along with one or more of those who actually taught the course, when needed. The principals and vice-principals would be involved in an on-going assessment of the success of the program. This would involve identifying problems, areas needing more attention, teachers needing more help, and organizing the workshops that need to be held during the school year.

The outdoor education program would be centered around the present elementary curriculum with more emphasis being given to the integration of social studies and science. The materials, texts and resources associated with these two programs would be used to show how the total elementary school curriculum (art, reading, writing, physical education, mathematics, science, music and social studies) can be integrated and taught successfully through the use of outdoor education.

The course should be offered in two consecutive summer sessions with the intervening school year and the following school year being used to help in the actual classroom implementation of the innovation. The teachers would be subjected to a program that will use the outdoors at least 50% of the time as the main teaching medium. This over-emphasis is necessary to give teachers the necessary skills to identify and use the various aspects of the outdoors as teaching opportunities. The teachers need the exposure to help them change their presently held feeling that real teaching has to occur in a classroom that has four walls and is inside a building labelled as a school.

The success of the program could be measured through the use of teaching situation observations, teacher and student questionnaires, and student evaluations. A comparison would be made between the teaching-learning situation prior to the start of the program, half-way through the program, and after the program has been in place for two years. Instruments would have to be developed or adapted to determine: teachers' attitudes toward the use of outdoor education as a teaching method; level of use of outdoor education; integration level of all subject areas; percentage of increase in social studies and science content in the program taught; attitude of the students to the change in the teaching method; and, level of attainment of curriculum objectives by the students after the adoption of the new program and teaching style. As these data were collected they could be used to provide for an ongoing change in the program to meet the perceived and revealed weaknesses found in it. The teaching situation evaluation could be completed through the use of an altered Flanders or I.O.T.A. instrument or some other teaching situation evaluation instrument. The increase in social studies and science content would be determined through a comparison of the daily lesson plan books of the teachers before and after initiation and completion of the program. To determine attitude toward and use of the outdoors, one could use an altered version of Mirka's (1973) outdoor education attitude inventory and Chase's (1969) outdoor education inventory.

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ENVIRONMENTAL EDUCATION PROGRAMS THAT WORK*

National Diffusion Network

The National Diffusion Network (NDN) is an organization of primarily school-based programs that have been approved for nationwide dissemination by the federal Joint Dissemination Review Panel (JDRP). Since its inception in 1974, the NDN has grown from 76 to 315 programs developed in large part by classroom teachers with grants from 26 federal programs and agencies and a variety of state and local sources. The JDRP examines for cognitive and affective gains presented by each applying program seeking identification as an "exemplary" program. Programs receiving such identification may be in any K-12 educational area, including environmental education. Below are reports of environmental education programs so identified, as indicated in the eighth (1981) edition of Educational Programs That Work.

APEC: AMERICA'S POSSIBLE ENERGY CHOICES

A program of energy education, with training for secondary science and social studies teachers and materials and study units for students.

Target Audience: Approved by JDRP for secondary science and social studies teachers and students, grades 9-12.

Description: The purpose of this program is to help students to become informed about the varied and controversial energy choices facing the nation, from both technical and social points of view. APEC is an interdisciplinary course designed to be taught by the regular classroom teacher over a three- to six-week period as part of the regular science or social studies curriculum. The course consists of 32 half-hour lessons that cover the following topics: demands for energy, existing energy sources, future energy sources, atomic theory and radiation, nuclear materials and energy plants, energy conservation, and nuclear safety.

A wide variety of materials is used to generate and maintain student interest. The course kit contains the following items: color transparencies, color slides, a narrated color filmstrip, audiotapes on the pros and cons of nuclear energy, teacher lectures, spirit masters of worksheets and quizzes, a bibliography of appropriate energy films, a paperback book for students on energy options, and suggestions for field trips and report and discussion topics.

Excerpted from Educational Programs That Work, 8th Edition. San Francisco, CA: Far West Laboratory for Educational Research and Development, 1981 (ED 209 768).

Teachers complete a 10-hour training program that includes background lectures on the energy situation and specific instructions for teaching each lesson. Project staff keep informed of developments in the energy field by attending national and state energy conferences and by conducting their own library research. They review course lesson plans and materials each spring and revise them as necesary. Teachers who have completed the training program are kept informed by the project's bimonthly newsletter and also receive revised materials from the project.

Contact the project about available training and other services.

Contact: Frank C. Witt or Paul A. Myers, Project Coordinators; APEC; Rockford District No. 205; 121 S. Stanley St.; Rockford, IL 61102. (815) 964-4810.

Developmental Funding: USOE ESEA Title IV-C. Approved 8/18/80

Compiled: Summer 1981

CURRICULUM MODIFICATION THROUGH ENVIRONMENTAL STUDIES: ENVIRONMENTAL STUDIES CENTER

Sequential, hands-on, field-oriented study of an estuarine ecosystem as representative of the natural system and the effects of human interaction with it.

Target Audience: Approved by JDRP for students of all abilities, grades K-8.

Description: This comprehensive, teacher-written program for grades K-8 provides progressive investigation of an estuarine ecosystem. Multidisciplinary in approach, it centers on a core of 37 learner-based objectives. Each objective is addressed by one or more instructional units and reinforced by a specific field activity. Each objective is also addressed on identical pre/posttests.

Immediately prior to the once-a-year field trip, the preparatory curriculum materials are used in one to four weeks of classroom preparation (one period per day). These materials include Learning Activity Packages, activities booklets, puzzles, games, and slide-tape programs. Class and teacher then visit the Center for a period of time that varies with grade level (ranging from two hours for kindergarten to two days for grades 5-8). While at the Center and on ensuing field trips to the estuary and ocean beach, each student participates in an active program of investigation, data collection, and/or problem interpretation and solution.

The programs themselves address basic skills development, organism identification, and environmental concerns. The metric system is used extensively. Vocabulary units are a part of each grade activity. Pre- and posttests measure cognitive gains by objective. All materials and instruments were developed and refined over a three-year period and subjected to extensive data analysis.

Contact the project about available training and other services.

Contact: Project Director; Environmental Studies Center; 2900 N.E. Indian River Dr.; Jensen Beach, FL 33457. (305) 334-1262.

Developmental Funding: USOE ESEA Title III. Approved 12/18/75

Compiled: Summer 1981

ECOS TRAINING INSTITUTE (ETI)

A program offering workshops designed to assist diverse local school districts with infusing career education, life-role skills, basics, environmental education, and other components into their curricula.

Target Audience: Approved by JDRP for teams of K-12 teachers and administrators and community representatives invited by the team.

Description: The ECOS Training Institute offers a three-day workshop in a process of curriculum design. Participating teams should have three to eight members, with more than one person from a school building; a maximum of 35 participants can be accommodated. The ETI process has proven effective on a national level in assisting diverse local school districts to achieve their educational goals (e.g., environmental education, career education).

The process has four interrelated elements: curriculum infusion, stewardship, community/school interaction, and teamwork.

Curriculum infusion is basic to the program. Through a step-by-step procedure, teachers examine their courses and incorporate priority concepts, knowledge, skills, attitudes, and activities of career education, environmental education, basics, life-role skills, etc., into appropriate segments of their courses. If needed, they can create new courses.

Stewardship is the students' active participation in the management of problems, i.e., a decision-making process. Suggested stewardship activities are demonstrated at the workshop. These and additional activities will be built into the new, infused curriculum.

Community/school interaction is the joint cooperation of schools and community in mutually beneficial educational efforts. Teachers are encouraged to call upon a wide range of resources when implementing their curricula, and community interaction provides a ready source of people and materials.

Teamwork is a cooperative effort on the part of the administration, students, teachers, and community members to coordinate and manage the change process in a school district.

Evidence of Effectiveness: Six aspects of the program were evaluated between 1971-74: materials, student achievement, student attitude, student behavior, teacher behavior, and administrative behavior. Evaluation data submitted to JDRP in May 1974 show that participation in ETI produced a significant increase in ecological awareness at the .001 level and an improvement in SRA subtest performance.

Implementation Requirements: Attendance at a three-day workshop is essential to understanding the ECOS process, developing a curriculum, and implementing the program. Before training, the superintendent must complete a district profile and sign a letter of agreement stating that workshop participants will have planning time to meet as a group, if they wish, for a period of nine months after the workshop and that workshop participants will present an awareness program to colleagues, board of education, and community members. Space found in and around most schools is satisfactory. No equipment need be purchased unless a school elects to become involved with environmental monitoring.

Financial Requirements: No charge for training or materials. Costs to district for training, travel, room and board (may be available through IV-C funding and negotiable).

Services Available: Awareness materials are available at no cost. Visitors are welcome at project site any time by appointment. Project staff are available to attend out-of-state awareness meetings (costs to be negotiated). Training is conducted at project site (costs to be negotiated). Training is also available at adopter site (costs to be negotiated). Implementation and follow-up services are available to adopters (costs to be negotiated).

Contact: Frank Thompson, Director; ECOS Training Institute; P.O. Box 369; Yorktown Heights, NY 10598. (914) 245-6919.

Developmental Funding: USOE ESEA Title III. Approved 5/14-15/74

Compiled: Summer 1981

FOUNDATIONAL APPROACHES IN SCIENCE TEACHING

A course in the concepts and methods of the physical, biological, and earth sciences and their relation to the environment.

Target Audience: Approved by JDRP for students in grade 7. This program has also been used with students in grades 6 and 8, but no evidence of effectiveness has been submitted to or approved by the Panel.

Description: This curriculum gives students a sense of the operations of the modern scientific community by involving them in typical activities and processes of inquiry and research. Students study three strands concurrently: physical science, ecology, and relational study. The physical science strand introduces such concepts as mass, volume, density, physical and chemical properties of matter, pressure, heat, temperature, vacuum, and energy; the ecology strand such concepts as ecology, plant and animal growth, weather and climate, field mapping, and population sampling; the relational study strand such concepts as resource management, technology, environmental use, food production, energy use, and conservation. Student and teacher materials promote the goal of developing scientific literacy among students. Text materials are at appropriate reading levels. The Student Text contains problem statements, suggestions to guide investigations, and summary questions focused on generalizations to be drawn from the investigations. The Student Record Book enables students to maintain a concise log of individual and class activities. A classroom library of Reference Booklets, which describe use of instruments, suggest experimental designs, outline experimental techniques, and provide necessary supplemental readings, help students to practice the skill of using outside references to supplement information available from the text. The Teacher's Guide presents the logic connecting topics and sequences. Keyed to the investigations in the Student Text, the guide includes teaching suggestions, advice on classroom procedures, and detailed discussion of the conceptual and practical development of the Student Text. Other materials for teachers include an Instructional Guide, an Evaluation Guide and monographs on program philosophy and instructional strategies.

Contact the project about available training and other services.

Contact: Donald B. Young, Associate Director; Curriculum Research Development Group; University of Hawaii; 1776 University Avenue, Room UHS2-202; Honolulu, HI 96822. (808) 948-7863.

Developmental Funding: University of Hawaii. Approved 12/9/80

Compiled: Summer 1981.

POLLUTION CONTROL EDUCATION CENTER--PRIORITY ONE: ENVIRONMENT

An interdisciplinary environmental education program focusing on values clarification and decision making.

Target Audience: Approved by JDRP for grades 1-6 and junior and senior high science, health, and social studies classes.

Description: The Pollution Control Education Center's program, Priority One: Environment, is a 13-unit interdisciplinary environmental education program for grades 1-12. Values clarification and decision-making activities lead to high student involvement in seeking honest and practical solutions to problems of immediate concern to today's pupils. Each multimedia instructional unit contains comprehensive student and teacher materials. The elementary units cover air and water pollution, solid waste management, recycling, and conservation of ocean and land resources. Four secondary units--The Energy Challenge, Protecting Our Water Supplies, Air Pollution and Your Health, and Open Lands and Wildlife--are most often used in the science program. However, they have been designed to be equally effective in social studies and health presentations. Schools interested in interdepartmental cooperative teaching will find these units appropriate.

The entire Priority One: Environment program can be implemented without special staff. Regular classroom teachers receive sufficient help from comprehensive teacher materials. In-service training is highly recommended but not mandatory.

Evidence of Effectiveness: Criterion-referenced pre/posttests designed by project staff were closely related to the instructional objectives upon which the units were based. Evaluation data have shown significantly increased mastery of program content. On both elementary and secondary units, Priority One students scored significantly higher (at the .01 level) on posttests than the control groups. Pupils learned new concepts that became part of their out-of-school experiences.

Implementation Requirements: Though not mandatory for successful adoption of the Priority One program, staff training is highly recommended. Districts providing in-service training found that a half-day program is successful for either the elementary or secondary program. If staff training is not desired, a thorough review of teacher/student materials should provide sufficient orientation to implement the program. The use of any one unit by one or more teachers is considered an adoption. The secondary level units are not restricted to use in science classes. The program in equally effective when presented in social science and health classes.

Financial Requirements: Costs of elementary units range from $75 to $85. The cost of each of the four secondary units is $70. Each kit contains complete instructional materials for 30 students. Multiclass use of kits is encouraged. Kits are durable, replacement materials minimal.

Services Available: Awareness materials are available at no cost. Visitors are welcome at project site any time by appointment. Project staff are available to attend out-of-state awareness meetings (costs to be negotiated). Training is conducted at project site (costs to be negotiated). Training is also available at adopter site (costs to be negotiated). Implementation and follow-up services are available to adopters (costs to be negotiated).

Contact: Charles Murphy, Director, or Karen Fuko, Project Disseminator; Priority One: Environment; Pollution Control Education Center; 2369 Morris Ave.; Union, NJ 07083. (201) 688-1200.

Developmental Funding: USOE ESEA Title III. Approved 9/18/74, 7/23/76

Compiled: Summer 1981

PROJECT ADVENTURE

An interdisciplinary program involving experience-based learning in academics along with group problem solving and an alternative physical education program in the out-of-doors.

Target Audience: Approved by JDRP for students of all abilities, grades 6-12. Parts of the program have also been applied in therapeutic and camp settings, but no evidence of effectiveness has been submitted to or approved by the Panel.

Description: Project Adventure is designed to add an experience component to standard high school and middle school courses. For many students, learning is essentially a passive process offering little opportunity to take responsible action or to test abstract ideas in the real world. Project Adventure represents a combination of Outward Bound techniques and philosophy with a humanistic group-process approach to learning and teaching. Small groups of students learn by actually working on specific reality-based tasks or problems in the community and the natural environment. The teacher's role is to state the problems and limits, giving students the responsibility for finding solutions. This approach has produced measurable improvements in self-concept, physical agility, and competence. It encompasses and supports a wide variety of teaching and learning styles.

The project is made up of two separate components, which may be used singly or together: a physical education program involving initative games, outdoor activities, and a Ropes Course apparatus that can be constructed by teachers and students; and an academic curriculum component designed to give hands-on experience and a practical application of the basics. The program's aim is to educate the whole student through sound academics, physical activity, and learning activities that enhance self-concept.

The project's strengths are its flexibility, the variety and quality of its curriculum models, and its ability to inspire and rekindle the enthusiasm of both teachers and students.

The project offers training programs in both academics and physical education to give teachers skills in program management, teaching strategies, and techniques necessary for implementation. Ideally, a core group of enthusiastic teachers from a single school attends a five-day workshop. Follow-up sessions and assistance with construction may also be part of the adoption process.

Many of this project's adoptions have been in the area of environmental education.

Evidence of Effectiveness: Evaluation data (1971-72) show that participation in Project Adventure significantly improved students' self-concept and level of achievement motivation as measured by the Tennessee Self-Concept Scale, the Rotter Scale of Internal vs. External Control, and a School Climate Survey. There has been measurable improvement of physical functioning on five of six measures. Students and parents see growing self-confidence and more active participation in school programs as outcomes.

Implementation Requirements: Attendance at the five-day workshop is essential. Ideally, one or more interested and enthusiastic teachers are trained in the physical education or curriculum workshop or in both. (Both programs can be taught by teachers who are willing to try.) A supportive (or at least neutral) administration willing to incorporate new teaching styles and programs that may involve some flexibility in scheduling is also required. No special facilities are needed, although the Ropes Course apparatus for the physical education program calls for some open space around playing fields or in a wooded area. No special staffing is required.

Financial Requirements: The five-day residential teacher-training program costs approximately $235 per teacher, including room, board, and materials; travel costs are not included. For the physical education component, schools should allow a minimum of $2,800 for Ropes Course materials (actual costs vary). For the academic component, costs may include transportation, substitutes, and camping equipment, depending on the curriculum developed.

Services Available: Awareness materials are available at no cost. Visitors are welcome any time by appointment at project site and additional demonstration sites in home state and out of state. Project staff are available to attend out-of-state awareness meetings (costs to be negotiated). Training is also available at adopter site (costs to be negotiated). Implementation and follow-up services are available to adopters (costs to be negotiated).

Contact: Dick Prouty, Project Adventure, P.O. Box 157; Hamilton, MA 01936. (617) 468-1766. Alan Sentkowski, Project Adventure Southeast; P.O. Box 5573; Savannah, GA 31404. (912) 354-5204.

Developmental Funding: USOE ESEA Title III. Approved 4/9/73

Compiled: Summer 1981

PROJECT CREATION: CONCERN REGARDING THE ENVIRONMENT AND TECHNOLOGY IN OUR NATION/NEIGHBORHOOD

An interdisciplinary curriculum (science-social science) in environmental education designed to prepare students to examine local environmental problems and understand why citizens must develop an environmental ethic based on sound technological choices.

Target Audience: Approved by JDRP for students of all ability levels, grades 9-12. This program has been used in other settings in selected middle schools and, with modifications, in high school-level special education classes, but no evidence of effectiveness has been submitted to or approved by the Panel.

Description: Project CREATION is a curriculum for high school teachers to use as the basis for a semester- or year-long course in environmental education. The curriculum is divided into four major categories: land use, pollution, urban management, and energy. A student studies one unit in each category during a semester, choosing units of his/her interest. The units available in each category are: land use--urbanization and zoning, streets and roads, parks and recreation; pollution--air, water, noise, and rural; urban management--solid waste, waste water, and population; energy--gasoline, electricity, nuclear power, coal, and solar.

The curriculum is intended to teach a series of objectives: those universal to all people on the planet, those particular to each of the four broad categories, and those unique to each unit. At the beginning of each unit, a student takes a pretest to assess understanding. The student completes the unit readings/activities, working individually, in a small group, or as part of the larger class. Progress is monitored on the basis of the student's objectives. Since the curriculum is designed around performance levels, students do not move forward in the unit until they demonstrate competence on objectives. When a unit is completed, students are asked to examine real environmental problems in the local community. Often, such problems exist within the school setting itself. Local problems selected for study may be simple, advanced, or open-ended, depending on student ability. A unit posttest measures student growth in terms of cognitive gains. In some districts, various media (slides, videotapes, etc.) have been used to record local problems for examination.

A common problem-solving model is used as a guide for examining local problems, weighted between sociological and purely scientific concerns. The program presents a balanced view of the needs of a technological society environmental ethic. The program has been successfully adopted/adapted in over 120 high schools located in 18 states in rural, suburban, and urban settings.

Evidence of Effectiveness: Three standarized tests were used in pre/posttest design with CREATION students and control groups: Morehead Environmental Awareness Test (1975-76, 1976-77, 1977-78); Test of Reasoning in Conservation (ETS, 1976-77, 1977-78); and local instrumemnt 1975-76, 1976-77, 1977-78). CREATION students showed significantly higher cognitive gains on all tests as compared to control groups.

Implementation Requirements: The curriculum can be implemented as a new course or as a modification of an existing ecology/environmental education course. A one-day workshop introduces teachers to the curriculum design and shows them how to adapt it to their own settings. Districts must pre/posttest students with the evaluation instrument designed for the course, and students must study a minimum of four units per semester. Many adopters have integrated their own classroom activities/exercises with program objectives, showing that CREATION is highly adaptable to individual districts.

Financial Requirements: There are 15 CREATION units, with support materials. Each unit costs $2.25. (Cost is subject to increase.) Curriculum materials remain in the classroom and can be used by many different classes each day. A classroom of 25 students doing small-group work could rotate 25 units. Schools using all 15 units should estimate costs based on $2.75 per unit. Travel expenses and per diem must be paid for staff who visit an adopter site.

Services Available: Awareness materials are available at cost. Visitors are welcome any time by appointment at project site and additional demonstration sites in home state and out of state. Project staff are available to attend out-of-state awareness meetings (costs to be negotiated). Training is conducted at project site in August and November, 1981 (all expenses must be paid). Training is also available at adopter site (trainer travel and per diem must be paid). Implementation and follow-up services are available to adopters (costs to be negotiated).

Contacts: Barbara A. Barchi; LaSalle-Peru Township High School; 541 Chartres St.; LaSalle, IL 61301. (815) 223-6596. Jean G. Hauser; 7320 Grist Mill Road; Raleigh, NC 27609. (919) 847-8207.

Developmental Funding: USOE ESEA Titles III and IV-C Approved 6/5/78

Compiled: Summer 1981

PROJECT ECOLogy (ENVIRONMENTAL CAREER-ORIENTED LEARNING)

A project aimed at infusing ecological concepts, career information, and futures understandings into basic skills subject matter by utilizing a format that is convenient for teachers to implement.

Target Audience: Approved by JDRP for grade 2 students of all abilities, teachers, curriculum planners, and program managers. This program has been used in other settings with students in grades K-1 and 3-12, but no evidence of effectiveness has been submitted to or approved by the Panel.

Description: The project's goal is to infuse ecology/science concepts, career information, and futures understandings into basic skills subject matter using an easily implemented format. Cycles, recycling, food, nutrition, pollution, and careers are all topics of the ECOLogy program. The project uses a motivating series of lessons/units/strategies/activities designed by teachers. Each unit is packaged to be used in a classroom over a four-week period, typically for one hour per day. The units are called Environmental Learning Experiences (ELEs), and many of them have supporting Project Activity Kits (PAKs). Six primary, 14 intermediate, and eight secondary units, some of which have supporting Project Activity Kits, are available.

Fifteen of the units have activities that relate specifically to the development of higher-level thinking skills--analyzing data, identifying trends/patterns/sequences, predicting outcomes, testing outcomes, and exploring open-ended quetions. Fourteen of the units have information and activities that relate specifically to career information and career understandings. These materials are coded to understanding jobs, relating basic skills to occupations, entry into the labor force, job availability, relating jobs to personal potential, educational and training opporunities, and job-securing skills. Each ELE is attractively packaged with a picture of the Project Activity Kit, background information, conceptual overview, master material list, and preunit activities and guided lessons. The contents of the unit focus on energy, water, air, solid waste, and noise. The materials are easily adopted by individual classroom teachers.

Evidence of Effectiveness: Analysis of test results showed a significant pupil gain at the .05 level of confidence. The instruments were developed locally to evaluate changes in cognitive knowledge as a result of project intervention and to measure the lower cognitive processes identified in Bloom's taxonomy. The JDRP report is available.

Implementation Requirements: Under system/unit adoption, teachers review project ECOLogy units, a cost worksheet is prepared, the decision to adopt is formalized, and a one-day workshop is scheduled. Cost range: $484 to $7,414, depending on the number and type of units selected. Under teacher adoption, individual teachers order and teach the unit(s) that suit their curriculum, using the pre/posttest format supplied by the project. No workshop is required. Cost range: $3 to $1,200. For a no-cost adoption, adopters select only units that have no supporting PAKs.

Financial Requirements: If the total program is adopted, a district purchases 27 ELEs, 14 PAKS, 24 evaluation packages, supplies to replenish kits, and training and follow-up by project personel, at a maximum cost of $7,414. Cost of unit adoption starts at $3. A cost worksheet is available upon request.

Services Available: Awareness materials are available at no cost. Visitors are welcome any time by appointment at project site and additional demonstration sites in home state and out of state. Project staff are avialable to attend out-of-state awareness meetings (costs to be negotiated). Training is conducted at project site (adopter pays only its own costs). Training is also available at adopter site (costs to be negotiated). Implementation and follow-up services are available to adopters (costs to be negotiated).

Contact: Bill Guise, Highline School District; 15675 Ambaum Blvd., SW; Seattle, WA 98166. (206) 433-2453.

Developmental Funding: USOE ESEA Title III Approved 12/18/75

Compiled: Summer 1981

PROJECT I-C-E (INSTRUCTION-CURRICULUM-ENVIRONMENT)

A concept-based, integrated, interdisciplinary, total K-12 environmental education program.

Target Audience: Approved by JDRP as a K-12 integrated environmental education program for all teachers in major discipline areas, excluding foreign languages, and for most student ability levels.

Description: Project I-C-E offers a total K-12 curriculum and instruction program for environmental education. Its primary goal is to lead students directly or subtly to awareness, appreciation, recognition, and action regarding the vital issues, concerns, and factors shaping environmental attitudes and values.

Twelve major environmental concept categories provide a framework for the program, as well as for each grade level and subject area. The entire program is neither scientifically nor technically oriented; it is based on the assumptions that all teachers can and should teach environmental concepts and that all disciplines (subject areas) must be used to reinforce environmental learning.

Through the use of a supplementary episode (mini-lesson) design, the learning activities may be integrated into traditional courses of study by substitution of content or activity; hence, the program does not make additional instructional demands on teachers. The lessons are referenced as to concept; they have subject-area and topic designations, suggest several alternative student-centered activities based on cognitive and affective objectives and necessary skills, and include suggested reference and instructional resources for teachers. The program emphasizes use of the urban and natural community as an extension of and reinforcement for classroom activities. No special equipment, facilities, or staffing are necessary.

Project curriculum guides and model field-activity units can be adapted and used by individual teachers, groups of teachers, schools, or a K-12 system regardless of locale or circumstances.

Since 1975, I-C-E has accumulated over 110 adoptions/adaptions in 20 states and the Virgin Islands, involving more than 5,000 teachers. A number of the adoptions include total K-12 district staff.

Evidence of Effectiveness: An evaluation design using project-developed criterion-referenced instruments tested for validity and reliability showed statistically significant student cognitive gains in the 12 major environmental concept categories for sample grades. Gains from pre- to posttest were as follows: grade 2, 5.28; grade 5, 5.14; grade 8, 29.5; grade 11, results were inconclusive. A complete evaluation report is available.

Implementation Requirements: The adoption/adaption agreement to implement the I-C-E program requires a minimum of 20 teachers in the district to be trained, or, if less than 20, a total building staff; district/school acquisition of curriculum materials for staff training; a one-day (five-hour) period available for training; local staff commitment to teach a minimum of six of the 12 program concepts; local responsibility for monitoring implementation; evaluation feedback from teachers on lessons and activities via simple monitoring reports; and, when possible, the pre- and posttesting of students at sample grades 2, 5, 8, and 11.

Financial Requirements: The 39 I-C-E curriculum guides range in price from $0.75 to $3.75. The cost of these, together with other program implementation materials, averages approximately $5 per teacher.

Services Available: Awareness materials are available at no cost. Visitors are welcome at project site any time by appointment. Project staff are available to attend out-of-state awareness meetings (costs to be negotiated). Training is conducted only at adopter site (cost to be negotiated). Implementation and follow-up services are available to adopters (costs to be negotiated).

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Developmental Funding: USOE ESEA Title III Approved 5/14/75

Compiled: Summer 1981

PROJECT KARE (KNOWLEDGEABLE ACTION TO RESTORE OUR ENVIRONMENT)

An environmental studies approach based on investigating real environmental concerns in local communities using "down-and-dirty" interdisciplinary activities.

Target Audience: Approved by JDRP for students of all abilities, grades K-12.

Description: Project KARE was established to develop an effective approach for strengthening environmental studies in local schools. The KARE approach uses process-education techniques that encourage students to confront real environmental problems in action-oriented interdisciplinary activities. This approach has been adopted in over 600 Local Action Programs conducted in local schools throughout the country. These schools differ significantly in size, demography, and wealth. Programs focus on a variety of environmental problems, including water pollution, community deterioration, and air contamination. Dealing with reality-based problems leads to cognitive development at awareness, transitional, and operational levels. Attitudes toward environmental issues are questioned, clarified, and frequently reformed. Multischool cooperation develops, since environmental problems ignore socio-political demarcations. The KARE approach is implemented by classroom teachers working as an interdisciplinary team. In elementary schools, teachers from two to eight classes at various grade levels cooperatively install the approach. In secondary schools, teachers of two or more disciplines are involved. The local school staff should consist of enthusiastic teachers and creative, resourceful administration willing to work with students in planning and conducting environmental studies activities. In addition, staff should be willing to leave the school building with their students, coordinate community involvement, and carry out curricular change on an incremental basis.

Project KARE has produced a series of 13 curriculum activities guides in environmental studies. KARE has also produced two 16mm color/sound films: "Environmental Studies--The KARE Approach," and "Urban Studies: Two Ways."

The KARE approach was developed and refined in 75 schools in southeastern Pennsylvania during 1971-75. Selected sites may be visited, and a "Guide for Visitors" is available upon request.

Evidence of Effectiveness: The KARE approach was evaluated during development by ERANDA, Inc. A comprehensive evaluation design measured general and localized cognitive growth, mastered competencies, attitudinal growth, effective learning atmosphere, and behavioral changes. Pre/posttesting data showed student growth in knowledge and attitude. Control groups were used. Test data are available on request.

Implementation Requirements: Adopters must be willing to attempt curricular change in small, discrete steps. In this process, schools initiate Local Action Programs utilizing activities from KARE Curriculum Guides. School personnel must participate in a three-day training workshop conducted by KARE staff, in which they acquire process skills, prepare plans for Local Action Programs, design evaluation procedures, and receive a set of KARE curriculum materials.

Financial Requirements: Since each adopter school initiates and generates a unique Local Action Program, cost varies considerably. Set of 13 KARE Curriculum Guides costs $65. Schools need not purchase guides to install a Local Action Program. Costs of the required training workshop ($300-$1,800), held at adopter sites, are shared by KARE, NDN facilitators, and adopters. Trainees may expend an average of $100-$500 local money per school for equipment as they establish their Local Action Programs.

Services Available: Awareness materials are available at no cost. Visitors are welcome any time by appointment at project site and additional demonstration sites in home state and out of state. Project staff are available to attend out-of-state awareness meetings (costs to be negotiated). Training is conducted at project site (adopter pays only its own costs). Project prefers to conduct training at adopter site (costs to be negotiated). Implementation and follow-up services are available to adopters (costs to be negotiated).

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Developmental Funding: USOE ESEA Title III Approved 5/14/75

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PANEL: DEVELOPMENTS IN ENERGY EDUCATION[*]

National Science Teachers Association

Organizations of professional educators have interfaced with environmental education in various ways. The National Science Teachers Association, for example, has produced educational materials targeted for classroom use for many years. Recently, NSTA has been involved in energy education, securing support from, at various times, the U.S. Office of Education's Office of Environmental Education, the U.S. Department of Energy, and several energy industries. Most recently, NSTA has housed a Project for an Energy-Enriched Curriculum. The report below is from NSTA's "Third Annual Practitioners Conference on Energy Education," which met in 1980 at Tennessee Valley Authority's Land Between the Lakes, Tennessee-Kentucky. The Practitioners Conferences have afforded an opportunity for participants to report on their efforts in energy education and their perspectives on how it might be furthered.

Seven of the conference practitioners shared their perspectives on energy education through a panel presentation and discussion. The panelists covered a cross-section of practitioners. They represented education, industry, government and the private sector. They included teachers, program directors and administrators.

The first panelist was John M. Fowler, Director, Project for an Energy-Enriched Curriculum (PEEC). He used the recommendations from the two previous Practitioners Conferences to measure the achievements of the past year or so and to point out the needs that remain unmet.

According to Dr. Fowler, the biggest gain over the past years has been the increase in materials development. Background materials are fairly plentiful. Classroom materials are also numerous. PEEC has 39 classroom units; Energy & Man's Environment has a large body of material; and materials sponsored by local projects and utilities are also widely available to teachers. Production is no longer the problem it was two years ago: high quality material is still needed, but there is no serious gap per se in the existing materials.

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[*] *From Third Annual Practitioners Conference on Energy Education, edited by Janet A. White and Helenmarie Hofman, pp. 29-38. Washington, DC: National Science Teachers Association, 1981 (ED 205 383).*

The development of dissemination channels has also proceeded well. Workshops for teachers include the summer institutes sponsored by DOE and similar summer courses supported by NSF. Inservice workshops for teachers have also been designated and funded by state governments, and energy education sessions have been put on by utilities and the energy industries. The Education Commission of the States (ECS) conducted a survey of activities in energy education like these in each state. From this survey, a program evolved in which ECS is working with seven pilot states to help each one develop an energy education policy.

There are some recommendations that have not been addressed and that continue to be important. No clearinghouse has been established for energy education materials, resources or resource people. There is still no large-scale federal support for pre- or inservice teacher training, and no evaluation of the impact of energy education programs on students has been undertaken. The impact of energy education on text books -- those representatives of the ongoing, established curriculum -- has been very small.

The assessment was concluded with a look at some of the bright prospects for energy education in 1981. National Energy Education Day, March 20, 1981, was mentioned as a day to raise awareness in schools across the country and begin projects/programs that would extend further into the school year. The development of the network organized by ECS and the Energy and Education Action Center to link State Energy Offices and State Education Agencies was encouraged, and a proposal to combine this ECS network with the PEEC network was outlined. Finally, the National Energy Education Conference, a large conference open to the public to be held in Detroit in November 1981, was announced.

The second panelist was Donald D. Duggan, Chief, Education Division, Office of Consumer Affairs, U.S. Department of Energy. He remarked on the past acccomplishments and future uncertainties of DOE.

Mr. Duggan began with a status report on DOE. Reorganization is certain, and its disappearance as a distinct agency is possible. However, energy education may survive if people will speak for its vitality. The cultivation and continuation of local programs will demonstrate the impact of energy education. The effect of local commitment cannot be overestimated, Duggan said.

DOE has spent about $5 million annually on energy education through the Education Division. A top down/bottom up approach has been used to motivate widespread activity in energy education. Most of the programs are grassroots programs -- PEEC, The Oak Ridge Associated Universities science activities, etc. These programs were designed to develop and disseminate materials and teacher training. $1.7 million has been allocated to teacher training. The Faculty Development Program made about 100 grants in 1980. These included summer workshops for high school and college teachers and inservice workshops for elementary teachers during the school year. These faculty development efforts have reached many teachers.

To work from the top down, DOE has tried to work through mechanisms already established in each state, much like the ECS project on energy education policy in which they are working with state agencies. There does not seem to be much commitment to energy education on the state level, however. A DOE conference was slated to be held in Iowa for key people in the state education agencies. The grant for this conference was designed to pay only half the travel, and only about 35 states were committed to send their people. This lack of commitment was reflected in the ECS survey. ECS found that only three states had allocated state funds for energy education.

There have been structural problems that have posed some obstacles to the development of energy education. For example, DOE distributes their materials free. However, the costs of printing, especially paper, have soared with inflation and the printing budget of the Education Division has been cut steadily from $1 million to a quarter of a million dollars. Also, to be included in what is taught in the classroom, energy education must make an impact on textbooks, and that is a slow process.

The next two panelists represented the Tennessee Valley Authority (TVA). Shaw Blankenship, Environmental/Energy Education Program, talked about the formal and nonformal components of TVA's environmental and energy education programs.

Energy, a "new" addition to the environmental education program, is one of several programs sponsored by TVA. (Included are programs in cultural resources, natural resources, agricultural development, community development, solar energy, energy conservation and energy production.) Both formal and nonformal components of the energy education program have been cultivated. The nonformal approach has been implemented with energy trails, energy exhibition centers made from older powerhouses, and interpretive programs for the public on energy themes. Land Between the Lakes stands as a unique example of a variety of energy education demonstrations. Some workshops on energy education have been held at these facilities.

Formally, programs in energy have been founded on the idea of partnership. Since TVA is a federal agency built on a conflict of interests -- power and natural resources -- a major effort has been made to work through existing systems to boost credibility. Five centers for environmental and energy education have been established in the seven state TVA region with matching funds from local universities. These centers serve four purposes: 1) they are used for pre- and inservice teacher training; 2) they provide regional services such as furnishing consultants to local schools; 3) they facilitate program development in areas such as college degrees and teacher workshops, for example; and 4) they sponsor research for environment and energy education at the regional universities.

Ideally, TVA would like to have 17 such cooperative programs to provide access to every county in the seven state area.

Also representing TVA was Ann Wright from Land Between the Lakes (LBL). She discussed the energy education program at this particular site.

The energy education program at LBL is based on both activities for the general public and the use of energy efficient facilities. For example, the visitors center has been a solar facility for enough time that its space and water heating systems are out of date. The interpretive center at the Homeplace 1850, a renovated working farm from the mid-19th century, is heated by wood stoves and cooled with heat pumps. The amount of energy used for space conditioning there has been reduced 50% due to the earth-berm design. TVA as a whole now emphasizes retrofitting old structures and designing energy efficient new buildings. Consuming energy is no longer promoted. LBL can boast an earth-sheltered building, a building heated by a trombe wall and a demonstration gasohol program.

Programs at LBL are designed to complement the tourism industry in the surrounding area. Visitors to the project are encouraged to conserve energy during their stay. Family campers at Rushing Creek campground are provided with group transportation to other parts of LBL to cut down on gasoline use. Seminars and demonstrations are offered on wood lot management, residential solar (passive is emphasized, but active hot water is included), and how to distill alcohol to fuel vehicles.

The energy education program at Land Between the Lakes uses both the "soft sell" and "hard sell" approach to reach the one million people who visit annually.

The next panelist was John F. Disinger, Associate Director, ERIC Clearinghouse for Science, Mathematics and Environmental Education (SMEAC). He discussed the activities of ERIC/SMEAC in energy education, briefly outlined the objectives and activities of the ERIC system, and noted some ways in which ERIC might be involved in an energy education clearinghouse.

ERIC, the Educational Resources Information Center, was established in 1966 in the U.S. Office of Education, and now is part of the National Institute of Education. ERIC is decentralized, composed of 16 clearinghouses around the country, with a central office in Washington, DC. The system's task is to provide information dissemination and retrieval services for the entire realm of education. SMEAC began as a science education clearinghouse in 1966, and early on added mathematics education and environmental education to its mission. Therefore, energy education is clearly within the scope of this clearinghouse.

There are more than four thousand documents related to energy in the ERIC system, but energy education is only one of several emphases. ERIC/SMEAC received grants from the Energy and Education Action Center to produce a newsletter and several fact sheets. More than 15,000 copies of each newsletter and fact sheet were produced and distributed, but requests have exceeded 50,000 for each; clearly, more support was needed.

Dr. Disinger recognized the need for more extensive clearinghouse activity in energy education; there is much appropriate material in existence that is not in the ERIC system. However, ERIC does have the most extensive energy education listings currently available in the nation, and continues to expand the listings monthly. If funding were available for expanded clearinghouse operations in energy education, it is likely that ERIC and/or ERIC/SMEAC would bid on the project. If not, ERIC and ERIC/SMEAC will be pleased to work with others involved in energy education clearinghouse activities.

To make such an undertaking practical, any energy education clearinghouse function should be computer-searchable using standard formats. There should be some provision by which to make the documents available to those who use the clearinghouse. These are features that make ERIC a useful system.

An ERIC search can shake loose a lot of material. There are several ways to get a search done. There are 700 "standing order" microfiche collections housed in libraries around the world, mostly in the United States. If one of these collections is convenient to the user, a manual (non-computer) search can be conducted there. Searches can also be purchased from commercial vendors, or bought as a "package" search for journal articles, fugitive documents (those not found in journals), or both.

To continue ERIC/SMEAC's emphasis on energy education, participants were encouraged to submit copies of their own instructional materials to be considered for inclusion in, and dissemination through, the ERIC system.

Next, John R. Vincenti, teacher, State College Area School District, Pennsylvania, and member, National Council for the Social Studies (NCSS) Science and Society Committee, spoke on energy education from the standpoint of the social studies.

He reiterated that energy is not only a science topic. The Science and Society Committee of NCSS has spent considerable time on the aspects of energy that are not strictly scientific, i.e., environment, resources, history and evolution of technology, politics, economics, and social impacts. Incorporating energy into the social studies curriculum, while either consulting teachers of other disciplines of team teaching, can bring about an atmosphere of cooperation and communication which conveys the wholistic nature of energy studies. Such programs have been initiated, but follow-up is essential to effectiveness. In Pennsylvania, follow-up was provided at the Penn State University Seminar on Energy in October 1980, which revealed successful incorporation of "real-life" implications into these teachers' classrooms.

In 1971 NCSS published their first guidelines for energy education in social studies classrooms which emphasized curriculum relevancy. These guidelines have been revised through the years and lead to the goals of the Science and Society Committee for 1981: 1) contact state offices of education to promote National Energy Education Day; 2) involve social studies teachers with science teachers in teaching energy; and 3) to pursue Faculty Development grants from DOE to enhance communications and energy education curriculum.

The panel closed with a talk by Janet Dove of the American Petroleum Institute (API), the largest national trade association representing all segments of the petroleum industry -- exploration, production, refining, transportation and marketing.

The petroleum industry has a long history of support to education. Through company foundations, and other grants, the industry supports research, various education projects, and provides scholarship monies. The results of a recent informal survey, with ten companies reporting, showed about $40 million had been spent annually in support of education. Several companies produce films and classroom materials. Many companies actively participate in efforts to bring energy information into the classroom. One current effort supported by six companies is the "Energy Adventure" van program developed by Oak Ridge Associated Universities. The program presents 35- to 50-minute demonstration-lecture assembly programs to high school students.

API's role in education has been to act as a clearinghouse for information, resources and advisory services. API also acts as a liaison with the educational community, and provides developmental services in education programs. One of API's primary energy education activities since 1977 has been the Energy Economics Forum program. This is a one-day teacher workshop designed to introduce teachers to the actual operations of the petroleum industry, provide educators with petroleum industry economic data, and give educators and petroleum industry representatives an opportunity to communicate through informal dialogue sessions. More than 25 workshops have been held, attended by some 1,300 teachers. This program is one example of a cooperative industry-education effort. It began in Florida when teachers approached API's Florida Petroleum Council with the idea of an energy workshop program for teachers. The program was developed, with teachers and industry people working together. It continues to be a cooperative effort among individual school districts, API and company people working together on program development.

As work with energy education curriculum proceeds, the need to seek current energy information becomes apparent. Industry can be a useful resource to educators and provide timely data in a field where the information changes rapidly. Some of the frequently used classroom materials are not conventional classroom texts, but rather booklets, brochures, fact sheets and background papers from industry which are frequently updated. Teachers should be encouraged to look to industry as a resource for energy information.

Each aspect of energy is so intertwined with the many other aspects of our lives that each energy decision we make must be approached not with just one special interest in mind, but rather by looking at the whole energy picture. This is a difficult task. While industry can provide technical expertise, educators may be uniquely equipped to deal with many of the social issues of energy. Both are very much a part of the overall energy picture. It is through cooperative efforts among industry, educators, government and others that all perspectives of the energy picture may be included. Through such efforts quality energy education materials will be developed.

ATTITUDES AND AWARENESS OF ENVIRONMENTAL EDUCATION CAMP USERS[*]

Pocono Environmental Education Center

What do people expect to get from environmental camps? What do they actually go away with? How can the quality of user experiences be improved? These are questions that every camp director needs to answer if he expects to provide meaningful and rewarding encounters. Techniques designed to answer such questions were developed and used at the Pocono Environmental Education Center (PEEC). The study was a cooperative venture between PEEC, New York University, and the U.S. Forest Service. Dr. Fred Geis was the principal investigator.

What is PEEC?

PEEC is a year-round base of operations for conferences, short-term institutes and workshops. Keystone Junior College of LaPlume, Pennsylvania, and the National Park Service cooperate in providing housing, study facilities, and program assistance at the camp for students (elementary through college) and virtually any other interested groups. The center is located in northeastern Pennsylvania within the Delaware Water Gap National Recreation Area. The majority of PEEC users come from metropolitan areas like New York City and Philadelphia. They represent a wide variety of backgrounds, ages, incomes and interests. Most first-time visitors have at least one thing in common: The know very little about the environment.

Study Results

Nine questions designed to measure the attitudes and awareness of environmental camp users were developed, tested, refined, and used at PEEC during 1976 and 1977. Key findings of that research, including summaries of user responses to questionnaires, are presented here.

Precamp attitudes of school groups

Data were collected from 12 groups, including 153 school children, ages 10 to 16. Results show that virtually all were looking forward to their visit to PEEC (Fig. 1). In fact, comparison of these data with group leader responses (Figs. 4 and 5) indicates that the kids were more confident and secure about the trip than their leaders.

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[*] *Excerpted from* *Measuring the Attitudes and Awareness of Environmental Education Users*, *by Roger E. McCay, David A. Gansner, and John J. Padalino. Broomall, PA: U.S. Forest Service, Northeastern Forest Experiment Station, Research Paper NE-426, 1978 (ED 170 143).*

Figure 1.—PRECAMP ATTITUDES OF SCHOOL GROUPS

Directions: (To be read to the students)

Think about each question and then answer it by circling *Yes* or *No* next to the question. Answer each question even when you decide you are not positively sure whether the answer is yes or no. When you are not sure just decide which is closest to what you think. (Then read each question to students and have them respond, if you feel they will have trouble on their own.)

Questions:	*Responses (in percent)* *Yes*	*No*
1. Have you talked to anyone who has been to PEEC?	94	6
2. Are you happy to be going to PEEC?	99	1
3. Are you worried about any part of your trip?	2	98
4. Have you ever taken hikes in the country or in the woods?	99	1
5. Do you feel that you can learn more about nature at PEEC then where you usually meet?	99	1
6. Do you feel that you will have more free time at PEEC than where you usually meet?	52	48
7. Are your parents worried about sending you to PEEC?	2	98
8. Do you feel that you will miss anything by being away from where you usually meet for 3 or more days?	4	96
9. Do you feel that you know enough about what will take place at PEEC?	61	39
10. Did you have a chance to help in planning what you will do at PEEC?	35	65
11. Circle yes for all the places you have visited:		
Museum	65	35
Park or Nature Trail	85	15
Seashore or Beach	30	70
Zoo	60	40
Bird Sanctuary	25	75

Postcamp attitudes of school groups

The sample consisted of 324 urban children from 15 groups and 1,056 suburban and rural children from 27 groups. Ages ranged from 9 to 16 years. Rural and suburban users seemed happier or more positive about PEEC than urban users in almost all areas except food (Fig 2). PEEC's meals led the list with urban kids and even carried over into an enjoyment for doing kitchen chores. The ASE's (Action Socialization Experiences—a series of difficult tasks designed to encourage group cooperation), hikes and swimming were given high ratings by all groups but were also just as frequently cited as negative experiences. Interview data indicated that this reaction was due primarily to the level of stress or effort involved. Those in adequate physical shape to participate fully in the activities enjoyed them. Those less well equipped or prepared did not enjoy them as much.

Figure 2.—POSTCAMP ATTITUDES OF SCHOOL GROUPS

Directions: (To be read to the students)

Answer each question by circling *Yes* or *No* next to the question. If you are not positively sure whether the answer is yes or no, decide which is closest to what you think. (Then read each question to students and have them respond, if you feel they will have trouble on their own.)

Questions:	*Responses (in percent)*					
	Urban users			*Suburban and rural users*		
	Yes	*No*	*NA*	*Yes*	*No*	*NA*
1. Do you feel that being at PEEC was better than:						
a) A one-day field trip?	74	19	7	90	7	3
b) Visiting with your relatives out of town?	43	48	9	70	26	4
c) The same amount of time at a summer overnight camp or scout camp?	69	24	7	69	26	5
2. Which things did you enjoy doing at PEEC:						
a) Studying science in the field?	47	39	14	58	37	5
b) Studying other school subjects in the field?	44	44	12	45	41	14
c) Getting to know your classmates better?	72	11	17	82	6	12
d) Getting to know your teachers better?	72	18	10	77	20	3
e) Doing kitchen chores at PEEC?	56	33	11	21	70	9
f) Learning the rules of how to live together	16	77	7	70	27	3
3. Did the program at PEEC turn out as you had originally expected?	50	45	5	44	50	6
4. Do you feel that the size of the group was good for this trip?	83	16	1	88	11	1
5. Do you feel that some of your teachers who were with you have gotten to know you better?	82	16	2	83	14	3
6. Have you made any new friends among your classmates while at PEEC?	82	17	1	71	27	2
7. Do you feel that living in a cabin with other students was good?	92	7	1	91	8	1
8. Would you have liked to have had more time to do school work during the trip?	15	85	—	14	83	3
9. Do you feel that the sleeping arrangements were good?	86	13	1	86	12	2
10. Do you feel that the meals were good?	95	4	1	90	8	2
11. Do you feel this trip should be shorter in length?	5	93	2	4	94	2
12. Would you like to go to PEEC again?	97	3	—	95	4	1
13. Do you think you learned a lot at PEEC?	95	4	1	88	10	2

For students over the 5th grade:

Questions:	—Most frequent responses— Urban users	Suburban and rural users
14. What PEEC activity did you learn the most from?	ASE's[1] Bird walk Hikes Nature crafts Swimming	Stream & pond study Fossils Compass work Dancing Survival
15. What impressed you most about PEEC?	Braille trail Hiking Swimming Cabins Food	Hikes ASE's Cabins Braille trail Snake show Swimming
16. What activity did you enjoy the least?	ASE's Bird walk Films Hiking Nature crafts Sports Swimming Arts and crafts Soil study	Forestry Compass work Plot study Ecology Eating Discovering PEEC Arts and crafts Hikes Films Pond study

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[1] Action Socialization Experiences—a series of difficult tasks designed to encourage group cooperation.

Environmental awareness test

Data were obtained from eight groups, all of urban children, a total sample of 183. Results indicate childrens' lack of historical perspective regarding population growth and land development and reveal the dependence that specialization imposes (Fig 3).

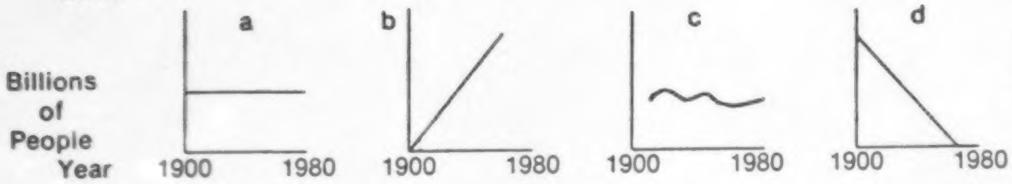
Figure 3.—ENVIRONMENTAL AWARENESS TEST

Directions:

Circle the answer you feel is correct. If you are not sure, circle the answer which is closest to what you think is right.

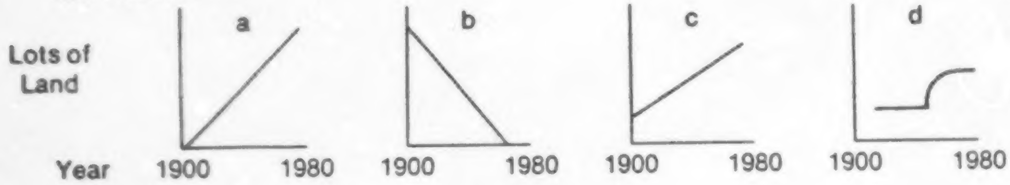
Questions:	*Responses*
	(Numbers indicate percent of responses to that question. * indicates correct response.)
1. The environment is:	
a) Woods and lakes	32
b) Cities and factories	8
c) Pollution	6
d) All our surroundings	54*

2. Which drawing best shows what is happening to the number of people in the world?



a)	16
b)	26*
c)	39
d)	19

3. Which drawing best shows what is happening to the amount of land for farms and forests?



a)	19
b)	31*
c)	14
d)	36

4. Most people live in cities because:	
a) Woods are dangerous with wild animals	19
b) There are more jobs in cities	70*
c) It is cold and lonely in the country	4
d) They like movies and music	7
5. When lots of people live close together like in cities:	
a) It is easier to feed them and clean the garbage up	9
b) You can have better schools and stores	28
c) It is better because you keep the pollution all in one place	18
d) It is important to keep things clean because disease would spread easily	45*
6. The reason the woods at PEEC are cleaner than New York City parks is:	
a) They have lots of people cleaning up	15
b) Country air is cleaner	18
c) People who visit PEEC are more careful not to pollute while they are there	61*
d) Wild animals eat the garbage	7

7. Before people came, the land New York City is on looked:	
a) Kind of like an empty lot does	8
b) Sort of like Central Park does	5
c) Sort of like the woods at PEEC	40*
d) Nothing was there until they built the city	47
8. New York City's water comes:	
a) From pipes	25
b) From the ground	18
c) From the Hudson River	10
d) From lakes and rivers far away from the city	47*
9. New York City's food comes:	
a) From stores	10
b) Only from farms in New Jersey	2
c) Only from farms in California	0
d) From farms all over the world	88*
10. If farmers stopped working, city people would:	
a) Have to eat canned and frozen food	10
b) Probably starve to death	20*
c) Have to eat artificial food	10
d) Have to grow their own food	60
11. In terms of pollution you can say that:	
a) Both children and adults cause pollution	76*
b) Children are against pollution but adults don't care	7
c) Adults are against pollution but children don't care	9
d) Only adults cause pollution	8
12. The hardest part of having a clean environment is:	
a) Getting everyone to cooperate	75*
b) Having scientists find solutions	9
c) Deciding which buildings to tear down	7
d) Getting factories to be clean	9
13. Most people don't keep the environment clean because:	
a) They don't know how	7
b) They don't care	64
c) They aren't responsible for the mess	18
d) It costs them time and money	11*
14. The most important reason for having a clean environment is:	
a) It looks much nicer	20
b) We need it for our health	50*
c) We need it for wild animals and trees	14
c) We wouldn't have to spend so much money	16

Precamp attitudes of group leaders

The sample consisted of 14 groups with a total of 41 leaders. Most listed personal, social, and leadership development as prime reasons for coming to PEEC (Fig. 4). Features of greatest interest were hiking and other outdoor activities.

Figure 4.—PRECAMP ATTITUDES OF GROUP LEADERS

		Most frequent responses
1.	Why did you select PEEC for your group?	Low cost, pleasant facilities, environmental science theme, location, helpful staff, type of programs.
2.	What activities, facilities, or services at PEEC are of greatest interest to you?	Hiking and other outdoor activities.
3.	If you had only one goal you could fulfill at PEEC, what would it be?	80% listed personal, social, or leadership development, the rest listed learning about the environment and fun.
4.	Do you feel you can achieve your goals for your group better at PEEC than where you generally meet? Why?	Yes, because of price and opportunities for group work.
5.	How many people are involved in planning your PEEC experience?	Average 4.5
6.	Do you feel that you know enough about PEEC to plan your experience? If not, why not?	Yes, although some were confused about timing and nature of some activities.
7.	Are you planning to utilize any members of the PEEC staff in planning your PEEC experience?	Most said yes—less than 10% wanted to be left on their own.
8.	How can PEEC be of help to you between now and the time your group comes to PEEC?	Want to know more about resources at PEEC. Provide a list of activities related to seasons.
9.	In terms of pre-PEEC preparation do you feel:	
	a) You and the other leaders are ready?	95% Yes
	b) The participants are ready?	100% Yes

Evaluation of preparation sessions by group leaders

Preparation sessions give group leaders a chance to learn about the facility and its programs. Data were collected from six groups with 102 individuals responding. All data were obtained from the urban groups as they were the only groups that had large organized leader preparation sessions at PEEC. Most all group leaders felt the preparation sessions were worthwhile (Fig. 5). They were most apprehensive about being able to coordinate all activities in the time allowed.

Figure 5—EVALUATION OF PREPARATION SESSIONS BY GROUP LEADERS

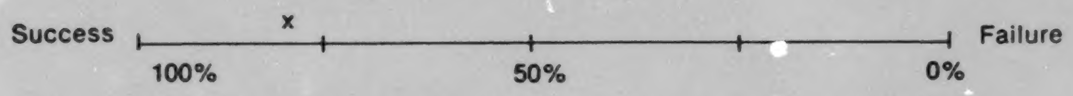
Questions:	*Responses (in percent)*	
	Yes	*No*
1. Do you feel that the activities at PEEC were well organized?	85	15
2. Do you feel that the time at PEEC in preparation for your group's trip was enough?	76	24
3. Was the time you spent at PEEC generally worthwhile?	95	5
4. Were the orientation activities organized to make good use of your time?	83	17
5. Did the orientation sessions provide you with the information you need?	64	36
6. Do you feel prepared to bring your group to PEEC?	69	31
7. Do you feel PEEC is prepared for your group?	87	13
8. Do you feel bringing your group to PEEC will be worth the work and expense?	91	9
9. What changes would you recommend in the preparatory program you participated in at PEEC?	More material presented prior to PEEC, more teacher input, more free time, better planning for evening activities with kids.	
10. What activity do you feel was most worthwhile for you?	Hikes, ASE's, seeing PEEC facilities.	
11. What did you enjoy most during your stay at PEEC?	Social hour, being outdoors.	
12. What are your greatest apprehensions about bringing your group to PEEC?	That we won't be able to coordinate all things in the time we have, kids will go wild.	
13. In what aspects of the PEEC programs do you feel least adequate?	Knowledge of nature activities, managing kids outdoors.	
14. In what program areas do you feel strongest?	Nature arts and crafts, Braille trail, free time.	
15. How can PEEC be of help to you between now and the time your group comes to PEEC?	Better informative material on hikes, ASE's, and nature activities; help divide kids up and help lead activities.	

Postcamp reactions of group leaders

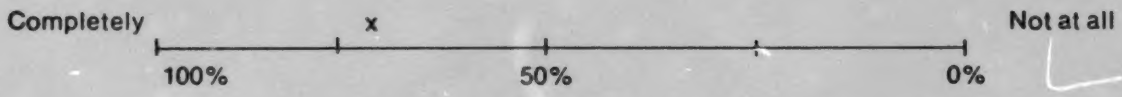
Twenty-four group leaders were interviewed. Of all features at PEEC, trail activities were their overwhelming favorite (Fig. 6). Some leaders complained about how the weather interfered with their program. There was a need for foul-weather activities.

Figure 6.—POSTCAMP REACTIONS OF GROUP LEADERS

1. How successful would you rate your group's trip to PEEC? (x indicates average)



2. To what extent was the success or failure attributable to factors within PEEC's control, such as facilities or activities?



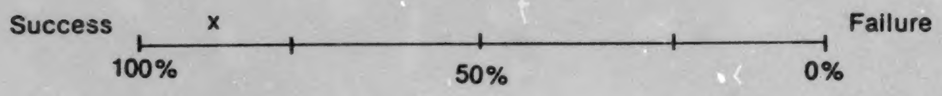
3.	What aspect(s) of PEEC was most useful to your group's activities?	Trails, classrooms, ASE's, locations.
4.	What aspect(s) of PEEC was mentioned most often as fun or interesting?	Trails, swimming pool, ASE's, astronomy, food
5.	What aspect(s) of PEEC was mentioned as a negative influence?	Nothing, food, non-PEEC factors such as weather
6.	If PEEC had $50,000 to invest in facilities or programs, what would you advise them to do with the money?	Expand trails, trail guides, and camping facilities; expand structured programming and nature study activities; increase staff, build gym, improve food, upgrade cabins; maintenance; subsidize rates.

Postcamp attitudes of adult participants

Data came from 12 groups with a total sample of 263 individuals. Most adults rated their trip to PEEC a success (Fig. 7). Their favorite activities were hiking and swimming. There were some complaints, mainly concerning cabin maintenance.

Figure 7.—POSTCAMP ATTITUDES OF ADULT PARTICIPANTS

1. How would you rate your activities at PEEC? (x indicates average)



2.	What did you most enjoy about PEEC?	More than 50% mentioned hiking trails, 35% mentioned swimming pool, 15% mentioned the surroundings and nature.
3.	What aspect of PEEC caused the most problems for you?	25% mentioned problems with cabins (heat, plumbing, beds), 10% mentioned lack of alternate rainy weather activities.
4.	If you were going to recommend one change or addition to PEEC, what would it be?	20% said improve cabin maintenance, 20% said more evening and indoor activities, 15% said more volleyball areas, 10% said to open the store longer and add more stock.

Precamp attitudes of college groups

This sample came from two groups with 58 respondents. The college students have had some environmental education (Fig 8). They weren't sure what to expect from PEEC but were looking forward to the experience.

Figure 8.—PRECAMP ATTITUDES OF COLLEGE GROUPS

	Questions:	*Responses (in percent)* *Yes*	 *No*
1.	Have you spoken to anyone who has already been to PEEC?	100	—
2.	Have you participated in courses which have involved field study?	93	7
3.	Have you ever taken hikes in the country or in the woods?	100	—
4.	Do you feel that you can learn more about nature at PEEC than where your class usually meets?	83	17
5.	Do you feel that you will experience more recreational activities at PEEC than at school?	95	5
6.	Do you feel that you know enough about what will take place at PEEC?	49	51
7.	Did you have a chance to help in the planning of the activities that you will experience at PEEC?	53	47
8.	Are you looking forward to your PEEC experience?	95	5

Postcamp attitudes of college groups

Respondents totaled 183 persons from eight groups. College students seemed to be favorably impressed with their PEEC trip (Fig 9). Prime benefits included getting to know their classmates and teachers better in a group living and learning experience.

Figure 9.—POSTCAMP ATTITUDES OF COLLEGE GROUPS

Questions:	*Responses (in percent)*	
	Yes	*No*
1. Do you consider that the PEEC experience was generally better than:		
a) A series of field trips.	97	3
b) A laboratory learning experience	99	1
c) A textbook learning experience	99	1
2. Do you feel that the major benefits to you during this program include:		
a) Studying science in the field	48	52
b) Studying any school subject in the field	65	35
c) Getting to know your classmates better	91	9
d) Getting to know your teacher better	86	14
e) Doing dining hall chores at PEEC	23	77
3. Did the program at PEEC turn out as you had originally expected?	52	48
4. Do you feel the size of the group was good for this experience?	98	2
5. Do you feel the student-instructor interaction at PEEC is different from that at school?	91	9
6. Have you made any new friends among your classmates while at PEEC?	97	3
7. Do you feel that the cooperation in group living by the students was good?	98	2
8. Would you like to have had more time to study independently while at PEEC?	56	44
9. Would you like to go to PEEC again for a similar experience?	100	—
10. Do you consider that your experience at PEEC was generally worthwhile?	100	—

11. Do you feel that the sleeping arrangements were?	Poor—0% Satisfactory—25% Good—46% Excellent—29%
12. Do you feel the meals were?	Poor—8% Satisfactory—25% Good—35% Excellent—32%
13. Do you feel that the length of your stay at PEEC was:	Too short—58% Just right—42% Too long—0%
14. What PEEC activity do you feel you learned the most from?	Braille Trail—30% ASE's—15%
15. What PEEC activity did you enjoy the most?	Tumbling water—35%
16. What activity do you think should have been omitted?	No consistent answer
17 What impressed you most about the PEEC area?	Scenery

Summary

Nine questionnaires were developed and used to measure the attitudes and awareness of environmental camp users. People at PEEC have already made good use of the techniques and data to improve their program of environmental education.

Most of the study results are so obvious as to speak for themselves. But one particular issue that surfaced continually during the course of study deserves mention. It concerns the role that environmental camps can play in the development of interpersonal relationships. Most group leaders either openly cited this as a major goal or at least alluded to it as a secondary reason for coming to PEEC. Be it a goal or not, it is a fact that the residential experience, helping each other on hikes and other cooperative group activities did lead to new friendships and understandings. There is clear indication here of an area for fruitful future work. A reasonable working hypothesis would be that people engaged in real tasks that necessitate cooperation, and supplied with some guidance, will form more interpersonal interaction skills and more positive feeling toward others.

AN ASSESSMENT OF CITIZEN PARTICIPATION IN NATURAL RESOURCE PLANNING AND DECISION-MAKING*

Sally R. Purohit

Is citizen participation in natural resource planning and decision-making within the purview of environmental education? Most persons concerned with environmental education in non-formal modes would respond to this query in the affirmative, and resoundingly so. However, many of them would and do express caution in discussing how it is best accomplished, and what its payoffs are, or even might be. In this paper, Sally Purohit takes us on a gun-and-camera tour of the citizen participation literature as a background to her investigation of the perceptions of state recreation planners relative to the citizen involvement process.

In recent years, demands for greater citizen involvement in administrative decision-making have escalated due to concerns over public accountability, the failure of previous public programs to meet genuine public needs, and the desire of individuals to participate more directly in decisions which affect them (Sewell and O'Riordan, 1976). This increased pressure of public participation in policy-making has resulted in renewed efforts at soliciting and incorporating citizen input into decision-making at all government levels, especially the federal level.

An example of this new emphasis on citizen involvement at the federal level is reflected in the current policy of the Heritage Conservation and Recreation Service, an agency charged with dissemination of Federal Land and Water Conservation Funds. These federal funds are administered at the state level to acquire land and develop recreational facilities. State planners are required to maintain and update a comprehensive outdoor recreation plan in order to qualify for the federal funds. This study focuses on citizen participation within the context of natural resource decision-making through an examination of public participation used in the state recreation planning process.

This study addresses four major objectives. They include: (1) what citizen participation techniques have been utilized by state recreation planners in the past five years and how were they used? (2) what are the dominant objectives of public participation at this level of natural resource decision-making? (3) how do state recreation planners feel about citizen participation in general and what problems have they encountered in their programs? (4) at what stages in a basic planning cycle is citizen input considered most valuable? Several explanatory variables were also used in this study, such as region, due date of the next state recreation plan, job status, sex, education and age.

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Citizen Participation and Natural Resource Decision-Making

Several authors have tried to clarify and structure the citizen involvement process (Wengert, 1976; Rosenbaum, 1976; Voth and Bonner, 1978). The sharing of redistribution of influence or power is a central theme in these classifications. Studies of citizen participation may be grouped into four basic types: (1) case studies of projects or issues, (2) analyses of citizen who participate, (3) studies of the perspectives of administrative decision-making, and (4) techniques of citizen participation (Potter, 1978). For the purposes of this paper, the most relevant studies are those which report on citizen participation techniques (particularly evaluation), and those which analyze agency staff strategies and objectives. Case studies offer some interest because they sometimes evaluate specific citizen participation techniques and examine the relationship between administrative staff and involved citizen.

Evaluation of Citizen Participation Programs

A wide variety of citizen participation techniques has been developed in recent years (Rosener, 1975: Lind, 1975; Voth and Bonner, 1977). While there is a large volume of materials relating to citizen participation techniques, there are not many studies which focus on the effectiveness of participation. As Rosener (1975) points out, there is no reason to assume that more participation will necessarily result in better policy. Thus, it is important to evaluate the different types of programs.

Much of the work that has been done is evaluation of citizen participation programs or techniques in natural resource decision-making originates in Canada. A recent article by Sewell and Phillips (1979) examines the evaluation models of four authors and 22 case studies. They conclude that there is no generally accepted evaluation model and all frameworks suffer from some serious deficiencies. They discovered that there is a high degree of variability concerning the perceived goals of public participation, evaluation criteria, and evaluative conclusions depending on whether agency personnel, citizen group representatives, or independent observers conducted the evaluation.

Types of citizen participation program evaluation criteria include: benefits derived from participation, extent of representation of various publics, resources available to the program, attitude of the agency toward the program, amount of technical assistance available to educate the citizens, and adequate planning for the program. Ideally citizen participation programs must be integrated into the planning process, be given adequate time to develop, and utilize appropriate techniques (Voth and Bonner, 1978). Sewell and Phillips (1979) found that independent evaluators emphasized the extent to which a citizen participation program fulfilled its objective, the degree of representation, and the accuracy of the information gathered as evaluation criteria. Our study attempted to use several of the criteria suggested by other authors as dimensions for evaluation of citizen participation techniques used in state outdoor recreation planning.

Strategies and Objectives of Administrative Citizen Participation

There have been several typologies of administrative citizen particpation strategies developed. For instance, Fox (1971) has delineated four strategies: decentralization, engineered consent, therapy, and equal protection. Others who have developed similar typologies are: Arnstein (1969) who elaborated a ladder of citizen participation based on degree of citizen power; Burke (1968) who identified five citizen involvement strategies; and Wengert (1976) who classified perceptions of public participation.

There are also several typologies of objectives which are usually more program specific than strategies or goals. Doerksen and Pierce (1975) identify three major goals or themes which characterize citizen participation strategies: self-fulfilling goals, symbolic goals, or instrumental goals. Similarly, Voth and Bonner (1978) have isolated the following objectives of citizen participation: (1) sharing power with citizens, (2) influencing citizen attitudes, (3) mobilizing the resources of the citizenry, (4) gaining credibility for programs, (5) reducing conflict, and (6) determining citizen preferences. Sewell and Phillips (1979) also identify three objectives of public participation programs which must be weighed against each other: a high degree of citizen involvement, a high degree of representation or equity, and high efficiency (time, cost) for the agency. These objectives represent trade-offs in that all three cannot be simultaneously pursued to the same extent.

Characteristics of Administrative Citizen Participation

In addition to goals, typologies and objectives, the relationship between citizens and bureaucrats which is characteristic of administrative citizen participation has been elaborated (Voth and Bonner, 1978). One characteristic is ambiguity of authority. This refers to the blurring of responsibility that occurs when government officials share decision-making with citizen groups. Redundancy of functions is another characteristic which concerns the duplication which frequently occurs between governmental entities.

The third characteristic is the development of a special relationship between citizens and bureaucracy. Administrators typically have the discretion to identify affected constituencies, and stimulate their involvement. This may reduce apathy and gain support for specific programs or it may lead to certain vested interests gaining public power and control. When citizen participation is mandated for a government agency, the agency also assumes authority for setting the guidelines for that participation. The fourth characteristic is the assumption of constitutional controls by the bureaucracy. The agency may determine who is a citizen, develop selection procedures, and even select the representatives.

Research Methods

Data Collection

A survey of state recreation planners was conducted by means of a mail questionnaire in June, 1979. Each of the 50 states and Washington, DC, was contacted individually. Lists of state recreation planners were obtained with the help of the federal agency, Heritage Conservation and Recreation Service, and by reference to the National Wildlife Federation's Conservation Directory (1979). The cover letter requested that the questionnaire be completed by the planner who was most knowledgeable about public participation in the state recreation planning process. Dillman's method for mail surveys (1978) was used as a general model for this study. The final response was 96%, providing data from 48 states and one district.

Measurement and Analysis

The survey instrument was designed especially for use in examining citizen participation in state recreation planning. Six of the most widely used citizen participation techniques were employed as the basis for formulating questions about actual use of specific techniques. These techniques (the workshop, attitude survey, public hearing, interviews with knowledgeables [key persons], advisory groups, and public information programs) were gleaned from a study of the public participation literature (Purohit, 1979). If planners had used any of these techniques they were asked to evaluate the level and type of participation, representation, effect on policy, and information gained. While there are many other evaluative criteria that could be used, the categories suggested (Voth and Bonner, 1978) were employed as fundamental dimensions for evaluating citizen participation techniques.

Efforts were also made to identify the relative importance of various objectives used in the recreation planning process. Items were developed for the six objectives derived from Voth and Bonner (1978), and an additional objective emerged from the pretest of the survey instrument. In addition, the characteristics of administrative citizen participation (Voth and Bonner, 1978) were utilized as the basis for item development in an effort to examine the attitudes of recreation planners toward public participation.

Additional information obtained through the questionnaire included an open-ended question on the problems and limitations of citizen participation and a question which was designed to discover how feedback from citizens is transformed into input to the planning process. A circular representation of the stages of a planning process was adapted from a cycle assembled by the Heritage Conservation and Recreation Service (1978). Recreation planners were asked to indicate at what points in the circle they received the most valuable input from citizens.

Explanatory variables which were utilized included: the due date of the next state recreation plan, region, job title, years in job, sex, education and age. As a variable, region was interpreted as the subdivisions of the country under different regional offices of the Heritage Conservation and Recreation Service. It was hypothesized that different district emphases might be reflected in state programs and attitudes. The state recreation plan due date was also utilized because new federal guidelines have resulted in changing citizen participation approaches. It was also hypothesized that differences might emerge between recreation planners and supervisory recreation planners.

In addition to percentage distributions of responses, a test of difference between means was used to examine regional differences, differences between job statuses, and differences in the due date of the next state recreation plan in relation to: (1) the number of times a specific public participation technique was used in the last five years, (b) attitudes toward administrative citizen participation, and (c) objectives of public participation. One-way analysis of variance was also utilized to examine regional, job status and state recreation plan date differences for use of techniques and attitudes toward public participation. In general the use of analysis of variance and tests of difference between means did not yield significant results.

Results

Evaluation of Citizen Participation Techniques

In Table 1, the median frequencies of use of citizen participation techniques show that the public hearing was the most commonly used technique, followed by key interviews, public information programs and advisory committees. Since a citizen survey is a costly and time-consuming technique, it should be expected that there would be fewer occurrences of this technique. These results should be cautiously interpreted because: (a) many recreation planners have not been in the same position for those five years, and (b) there appear to be differences in perception of what constituted a single occurrence of a technique.

Other criteria which were used in this analysis included participation, representation, effect on policy, and types of information gained. Recreation planners were asked about the number of people involved and whether the extent of activity was active or limited. Generally, the public hearing involved less than 100 persons, with limited participation and to a lesser extent, active participation. The survey almost always involved over 100 persons, and was usually considered active participation. Both key interviews and advisory committees typically included less than 100 persons with active participation. Workshops included both large and small numbers of participants, and the participation was perceived as active.

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TABLE 1

The Use of Selected Citizen Participation Techniques by State Recreation Planners

Dimensions	Percentages Public Hearing	Survey	Key Interviews	Advisory Committees	Workshop	Public Information
Medium Frequency (last 5 years)	9.6	2.2	5.8	5.1	4.2	5.3
Level and Type of Participation						
> 100, active	19.4	77.5	16.7	16.2	45.7	NA
< 100, active	27.8	2.5	58.3	75.7	42.9	
> 100, limited	11.1	20.0	8.3	2.7	5.7	
< 100, limited	41.7	0	16.7	5.4	5.7	
Representation						
cross-section	37.8	82.9	8.3	26.3	5.6	81.3
leaders	13.5	2.4	55.6	36.8	22.2	0
specialized groups	27.0	0	16.7	28.9	41.7	9.4
other	21.6	14.6	19.4	7.9	30.6	9.4
Effect on Policy						
one of several factors in setting policy	70.3	78.0	80.6	73.7	72.2	NA
basis for policy	10.8	14.6	16.7	23.7	11.1	
no effect on policy	10.8	4.9	2.8	2.6	5.6	
other	8.1	2.4	0	0	11.1	
Information Gained						
determine supply	11.1	14.9	15.5	11.4	6.8	10.9
assess demand	16.7	36.6	15.5	15.9	16.2	10.9
identify problems	37.5	31.7	40.5	37.5	48.6	32.6
approve or reject aspect	30.6	16.8	28.6	34.1	28.4	19.6
none	4.2	0	0	1.1	0	26.1

Representation was designed to discover what segments of the population were researched by each technique. Surveys were most often used to obtain a cross-section of opinion, and key interviews were designed to interview leaders. Public information programs reached a broad cross-section. The most commonly utilized methods of disseminating public information were brochures, newsletters and other types of publications. Letters and exhibits were also used.

There is more diversity in the audience reached with the public hearing, advisory committees and workshops. There are certain tendencies which emerge, however; about 40% of the states reached specialized groups with the workshop, reached a cross-section with public hearings, and reached leaders with advisory committees.

Generally, input from each technique was used by the states as one of several factors in setting policy, and was usually not ignored in setting policy. A few states did use the information derived from a technique as the basis for policy (advisory committees in particular).

Several kinds of information were gained from the use of each technique. Overall, the techniques were most useful in identifying problems. The survey was also frequently used to assess demand. For all techniques except the survey, at least half of the respondents gained information which was used to approve or reject aspects of policy. Generally, the techniques were only occasionally used to determine supply, although the survey and key interviews were used for that purpose more often than other techniques.

Problems in the Use of Citizen Participation

An analysis of the responses to an open-ended question about the problems and limitations on the use of citizen participation revealed that a majority of the state planners mentioned either time or cost constraints. The major problem was time (29%) and the second most important problem was costs (21%). In order of their ranking, other problems which were mentioned by several states were: generating and sustaining public interest (15%) and obtaining input which is representative and includes the average citizen (12%). Others problems were isolated, such as problems with specific techniques and the lack of staff resources. Discrepancies between citizen participation methods and objectives and problems with the domination of special interest groups were also enumerated.

Many of the recreation planners included additional information about their citizen participation programs, and one conclusion that could be drawn from a comparison of many states is that there seemed to be a wide variety of approaches and programs. The types of programs were partially dependent on state characteristics, such as a small and dispersed population (North Dakota) versus a large and concentrated population (California). Also, some of the planners perceived a need to maintain an awareness of the values and attitudes of the citizens of their state.

Stages of Recreation Planning

The circular representation of planning stages in which citizen input may be obtained contained eight steps: generation of ideas and problems, assessment of supply, determination of demand, identification of needs, policy options, policy plan, approval of policy plan, and implementation. The two stages of state recreation planning which emerged as important sources of input were: (1) the generation of ideas and problems; and (2) the identification of needs. The least utilized stages of input were policy plan and implementation. Responses were well distributed among the different stages, but generally input was utilized in the initial stages identifying needs, problems and demand rather than in the latter stages of setting and implementing policy.

Objectives of Citizen Participation

In Table 2, the percentages of states that ranked an objective as first, second or third choice and cumulative percentages for ranking of each objective are listed. A wide majority of respondents selected determining citizen preferences (84%) and educating citizens about programs and processes (83%) among their top three rankings. Two other objectives emerged as next in importance: 61% of state recreation planners ranked "utilize human resources of citizens," and 60% rated "gain support for programs" as high priority objectives. Thirty-eight percent of the states considered the objective of reducing conflict as important, and 35 percent listed fulfilling legal requirements among their top three choices.

Attitudes Toward Characteristics of Citizen Participation

Attitudes of recreation planners toward characteristics of administrative citizen participation were examined. The four characteristics unique to administrative citizen participation developed by Voth and Bonner (1978) were empirically employed. Support was found among this group of state recreation planners for three of the four characteristics, as measured in this study: ambiguity of authority, the development of a special relationship between decision-makers and citizens, and the delegation of constitutional controls to agencies. Planners did not perceive redundancy of function between themselves and citizens. Planners felt that they have the right to develop selection procedures to determine which citizens to involve in the public participation process, thus assuming some formerly legislative responsibilities. They agreed that administrative decision-makers are subject to demands from citizens as well as higher echelons of government, which results in vague authority patterns. Table 3 presents percentage distributions of these responses.

Another important issue in administrative decision-making is the dividing line between setting policy and administering policy. Especially in public participation policies, the line may blur. Recreation planners were asked whether they should avoid direct participation in the political process; responses were split on this issue.

TABLE 2

Citizen Participation Objectives

Objectives	Percent of Sample Ranking Item			
	1st Choice	2nd Choice	3rd Choice	Among Top Three Choices
Determine citizen preferences N = 43	38.6	38.6	6.8	84.0
Educate citizens about programs and processes N = 42	26.2	26.2	31.0	83.4
Utilize human resources of citizens N = 32	21.2	15.2	24.2	60.6
Gain support for programs N = 35	2.9	22.9	34.3	60.1
Reduce conflict N = 29	6.9	10.3	20.7	37.9
Fulfill legal requirements N = 26	23.1	7.7	3.8	34.6
Increase power of citizens over programs N = 21	14.3	9.5	9.5	33.3

TABLE 3

Characteristics of Administrative Citizen Participation

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Ambiguity of authority (SCORP planner answers to citizens and supervisors in state government)	18.4	53.1	8.2	12.2	8.2
Redundancy of function (Work of citizens overlaps with work of SCORP planners resulting in duplication of effort)	--	8.2	8.2	59.2	24.5
Special relationship (Citizen participation encourages close relationship between SCORP planners and involved citizens)	16.3	59.2	8.2	16.3	--
Delegate constitutional controls (SCORP planners have right to develop selection procedures to determine which citizens to involve in public participation process)	17.0	44.7	17.0	14.9	6.4
Administration vs policy-making (SCORP planners should avoid direct participation in the policical process)	14.6	29.2	10.4	31.3	14.6

Continued...

TABLE 3
Continued

Characteristics of Administrative Citizen Participation

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Views of citizen participation					
1. Citizen participation should be limited because SCORP planners have expertise	4.1	14.3	6.1	51.0	24.5
2. Costs of citizen participation in SCORP planning outweigh benefits	--	12.2	24.5	44.9	18.4
3. Citizens participation in SCORP planning is impractical	--	4.1	10.2	51.0	34.7
4. A serious problem in SCORP citizen participation is reaching the average citizen	34.7	49.0	6.2	6.1	4.1

Four other items examined attitudes of recreation planners toward citizen participation. Most state recreation planners did not share an elitist view of citizen participation. How feasible is citizen participation in recreation planning? Very few planners felt that the costs of citizen participation in recreation planning outweigh the benefits or that public participation is impractical.

Another issue or problem which has emerged in citizen participation conferences is how to increase the involvement of the "average" citizen, the person who is not represented by an organized group. The citizen with a special or vested interest is more easily identified and more likely to volunteer to participate. This issue was addressed in order to determine whether recreation planners perceived it as a serious problem, and a majority agreed that it is a problem of substance.

Conclusions

Several major conclusions may be drawn from this study. One of the purposes of the study was to discover what citizen participation techniques state recreation planners are using. Isolating six basic types of techniques, it was found that the public hearing, key interviews, public information programs and advisory committees were used more often than workshops or surveys. Other evaluative criteria which were used include: participation, representation, effect on policy, and information gained. It appears that citizen participation techniques differ in their appropriateness for a certain size of audience, type of activity, and the kind of audience reached. All the techniques were used as input into the setting of policy and occasionally served as the primary basis for policy. Generally, citizen participation techniques are most useful in identifying problems, but also assist in approving or rejecting aspects of policy.

The selection of planning objectives reveals a great deal about program emphases and values behind them. Recreation planners measure citizen preferences in order to establish state needs and demands. However, they are also concerned about a more informed public. Another common administrative goal is to gain citizen support for programs. Many planners are also anxious to utilize the human resources that citizens represent to supplement staff resources. Notable numbers of respondents were concerned about using citizen participation to reduce conflict and to fulfill legal requirements. These findings seem to support the conclusions of Sewell and Phillips (1979) who identified three conflicting objectives of public participation: high efficiency for the agency versus high degree of involvement by the citizens versus high degree of equity among the public.

The attitudes of state recreation planners toward characteristics of administrative citizen participation were examined. Generally, three of the four characteristics identified by Voth and Bonner (1978) were supported by the planners. Respondents were divided over whether recreation planners should avoid direct participation in the political process.

Planners seemed to feel that citizen participation in recreation planning is a legitimate and worthwhile activity, although they certainly recognize problems. One problem is trying to reach and involve the average citizen, rather than just the citizen with a vested interest.

The stages of planning in which citizen input is most valuable were identified as the generation of ideas and problems and the implementation of a policy plan. Time and cost constraints emerged as the major problems associated with citizen participation in state recreation planning. Other important problems were generating and sustaining public interest, and obtaining input which is representative and includes the average citizen. It seems likely that these problems are common to all administrative citizen participation efforts.

One important finding from this overview of citizen participation in state recreation planning is the great diversity of approaches and programs in existence. Programs seem to reflect characteristics of the state in which they are implemented. Planners recognize the importance of staying in touch with the values and attitudes of the citizens they represent.

It also appears that state recreation planners support the use of citizen participation, but there are varying degrees of commitment to it as a tool for decision-making. A public participation process tends to strain the already limited staff resources of most agencies responsible for the development of the state recreation plans. Funds which are used for such programs are then not available for other purposes, such as acquiring land and developing local recreation facilities. However, the increasing emphasis on broad-based citizen participation at the federal level will eventually result in more extensive programs at the state level.

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MOVING AHEAD IN ENVIRONMENTAL EDUCATION*

Philip C. Ritterbush

For about ten years, an Office of Environmental Education in the U.S. Office of Education (later, the U.S. Department of Education) was responsible for coordination of environmental education at the federal level; in particular, it administered a relatively small grants and contracts program. This report, by one of the contractors, discusses some of the thrusts developed under sponsorship of that office.

Environmental Education in Context: Understanding the Systems Ecology of Industrial Society

In the recent affairs of the nation, environment appears as a ground over which opinions divide. Concern for the natural environment seems opposed to the economic imperatives of industrial society. Environmental protection has been criticized as an unwelcome complication of economic development, on grounds that it adds years to the time required to complete public works and imposes burdens of regulation on business that threaten our competitiveness in world markets. On the other hand, economic development activities have been criticized as harmful to the environment. This dichotomy, however, has been observed by many to be a false one. The principles that govern nature--the ecology of nature--also define, to a significant degree, the nature of human society and its options for achieving a state of well-being, for successfully performing its economic functions. The ecosystem is the economy of nature. The economy is the ecosystem of human civilization. The two are inextricably intertwined.

Environmental education aims to improve our understanding of the natural and social support systems as an interactive, interdependent whole. Systems as a whole tend to be invisible to the people they serve and therefore rarely make news. Similarly, the normal functions of interaction between the natural and social support systems or between their respective subsystems tend to be invisible. But it is the normal functions of these interactions--meeting demand, increasing efficiency, maintaining and inproving quality, planning or investing for the future--that are the central concern of environmental education.

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Understanding the options, constraints, opportunities, and costs related to the use and functions of these systems will be needed if we are to increase in the future our ability to resolve the issues that emerge from our need for effectively functioning social and natural support systems. It is not a question of "either, or." Both must be maintained if humankind is to survive. Environmental education attempts to provide these understandings.

The sentimental vein of nature appreciation is entitled to respect as part of our national heritage, but this cannot take the place of knowledge of the interactions between nature and human society. Conversely, those who have been accustomed to regard concern for ecological balance or protection of the natural support system as somehow inimical to economic development, for example, overlook the fundamental interdependence between them. The first scientist to derive a vision of "a vast interstate and foreign commerce" for the United States from an accurate assessment of its natural resources was a Harvard University economic geologist, Nathaniel Shaler. In this remarkable treatise, Man and Nature in America (1897), he wrote that an understanding of the environment must guide the design of economic growth. "With the growth of each of these elements of civilization; the arts of the household, of war, and of trade, the chains which bind man to the earth become even stronger. It is impossible to depict in an adequate way the dependence of our modern civilized man upon the world about him."

Difficult or not, students are beginning to learn about the interdependencies and interactions between human society and its natural support system. On the day you read this it is likely that a school group has visited the power plant that lights your room. Their visit is part of a course on the economic, health, and natural resource costs and benefits of direct and indirect uses of energy in food production. Among other things, they are tracing the energy inputs from fossil fuels in this process and have learned that even the electric power used by your community is derived from fossil fuels.

The laws of the science of energy apply with equal force to living metabolism, to work in all its forms, to engines and their fuels, to lakes and meadows, to insect colonies and electric power systems. In many schools students are comparing the energy content of fertilizers, foodstuffs, forest industry byproducts, human wastes, fossil fuels, and alternative power sources in process budgets for agriculture, manufacturing and transportation. Homework exercises involve youngsters in calculating the fuel savings from domestic insulation, industrial cogeneration of power, and automotive innovations. These youngsters are beginning to think about energy systems in terms of operating efficiencies, fuel requirements, and external environmental impacts.

It is the natural community of organisms sustained in any given stream that enables it to purify human wastes. A good number of tomorrow's citizens have counted the densities of these organisms in nearby streams, projected future community population growth based on hypothetical economic development plans for the area, and are learning how to assess the probable impacts of population growth on the waste treatment facility.

Student "representatives" of consumer groups, regulatory bodies, banks, and legislators are earnestly discussing the future shape of the economic infrastructure of their region. Others are developing alternative transportation plans for their city and are identifying the possible impacts of the plans on the air and water quality, land use patterns, and health, economic, and social needs of the city.

Activities such as these have been found to be among the undertakings of projects funded through the federal Office of Environmental Education in a study conducted by a consortium under a contract with the University of Virginia. In these projects, students are beginning to study, as interrelated wholes, processes that generally are perceived and treated in a fragmented way.

The purpose of such environmental education is not to second-guess the decisions being taken by the community now, but to foster a balanced awareness of factors constituting a network of interactions among humans, their social systems, and the total physical and biological environment so that future decisions may be more wisely appraised and more soundly executed.

While much remains to be done to improve student learning opportunities in environmental education and to better assist teachers who strive to engender this "holistic" understanding, progress is being made.

In the classroom an energy facility proposal is likely to be regarded in a regional context where benefits and risks can be expressed in comparable terms so that views do not become too strongly opposed to be reconciled. Innovative methods for studying and resolving issues can be practiced in the classroom, for later transfer into the informal education sector and into public settings.

The regional awareness that permits the integration of watersheds and transportation networks into a conceptual framework for thought also serves as a ground for the comparison of health risks with development gains so as to engender an awareness that natural resources and social facilities are complementary features in encompassing patterns.

The art of understanding human settlements traces relations among support systems or networks, the built environment of "shells" for social activities and shelter, social performance, human satisfactions, and the natural environment.

Someday it may become necessary to replace the waste treatment plant in these students' community, to consider expansion of their local utility's power generation capability, or to develop a new economic development plan for their region. The process of obtaining public approval will be less likely to take the form of a pitched battle. It is likely instead that alternative proposals will be reviewed thoughtfully in a public manner. Instead of being divided by issues, the community will be more likely to achieve a consensus in favor of an approach or method that is most responsive to the needs and constraints of both the social and natural support systems of the community and region.

Ground divided by the issues of today is being sown with seeds of awareness and knowledge to yield a harvest of understanding for citizenship tomorrow.

Setting the Aims of Environmental Education

In 1970 Congress enacted the Environmental Education Act out of a recognition that democratic political institutions could not function properly unless society's relations with the environment were more widely and fully understood. The Act defines environmental education as "the educational process dealing with man's relationship with his natural and man-made surroundings, and includes the relation of population, pollution, resource allocation and depletion, conservation, transportation, technology, economic impact, and urban and rural planning to the total human environment." It authorized a program of grant and contract support for curricula "in the preservation and enhancement of environmental quality and ecological balance." Support was to be provided for programs in elementary and secondary schools.

Teacher training and other means of professional development were to be made available to government employees, and business, labor, and industrial leaders and employees. Outdoor ecological study centers were to be planned and materials suitable for broadcast use in the mass media were to be developed, as were "community education programs on environmental quality, including special programs for adults."

Appropriations for the first full fiscal year were authorized at $5 million, and $15 and $25 million, respectively, for the years following.

Two Congressional aides who participated in the passage of the legislation later wrote a book about the Act in which they characterized the approach the authors of the bill hoped would eventuate in the schools. "That process was action-oriented and it envisioned increasing environmental awareness and providing the skills, knowledge, and motivation required to solve environmental problems." (Brezina and Overmyer, 1974).

Four years after passage of the Act, a team of reviewers from the Arizona State University criticized environmental education, in practice, as being too narrow in approach and orientation. They found that there had been a "failure at all levels of education to achieve a truly integrative treatment of the relationships between man and his natural and manmade surroundings." (Environment-Based Environmental Education).

The principal recommendation of the study was "to develop core themes and a conceptual structure in environmental education that synthesizes and integrates pertinent subject matter across and between a variety of traditional disciplines." This study recognized the difficulty of realizing the aims of the Environmental Education Act in an educational system built around individual subjects individually taught in individual classrooms. As work under the Act continued in succeeding years, more effective approaches might emerge from experience gained at the community level. The difficulties of pursuing the Act's encompassing aims through normal operating structures of education were also apparent in administration at the federal level, where $3.5 million remained the maximum available for the direct purposes of the Act in any fiscal year.

Looking toward the tenth anniversary of the legislation, the Office of Environmental Education provided for another review. An Environmental Education Project was established in the Research Laboratories for Engineering Sciences at the University of Virginia. The curricula and programs funded by the Office were reviewed. Digests were prepared to improve access to these materials by educators.

The purpose of the UVA project was not competitive evaluation of hundreds of classroom and community efforts. This would have necessitated comparison of many different kinds of environmental and educational situations across an entire nation. Instead the UVA consortium sought to distill from this wide-ranging educational experience a set of goals and a set of designs for processes whereby the goals could be met.

Their study aimed to determine what kinds of processes will best enable a complex industrial society to prepare its citizens to participate in an informed and responsible way in the resolution of the environmental issues of today, and to contribute to an improved quality of life in the future.

When the Environmental Education Act was proposed, several educational officials pointed out that the schools were already treating many aspects of the human environment in social studies and natural science classes. Without question, most of the information which students acquire about the natural--and the man-made--environment must come through instruction on the pattern that now prevails in the nation's schools, as must their basic skills in learning.

But the premise of the Environmental Education Act was that the choices facing our society required a new dimension in citizenship, going beyond the normal terms of political debate. The environment, as some civic leaders were rather ahead of many educators in perceiving, posed choices not merely about what actions citizens should expect of government, whether local or national, but how they could participate more knowledgeably and responsibly in the illumination of issues and in the choice of options. How could they become more knowledgeable about energy systems and the relative costs and benefits of their development and use? How could they acquire an image of the human settlement pattern as a connected whole, and its implications for the social and natural support systems? How could they fulfill individual responsibilities of trusteeship for future generations?

Community representatives who participated in environmental education projects have indicated that issues concerning them could not be properly understood unless students could learn, in the schools, methods whereby choices confronting the society could be examined systematically and brought to the point of informed decision.

The program authorized by the Act was one of innovation in the scope of instruction, functional linkage between ecological and social analysis, and experiments with curricular approaches encompassing the full range of environmental relationships. The fact that proposals for such undertakings have been funded and successfully implemented in school systems and communities can be cited as proof that the approach which the Act sought to encourage is one that has been found acceptable to educational as well as civic interests throughout the country.

The UVA study provided considerable definition of environmental education in a way that lends itself to assessment of local and regional progress. Four characteristics of success were identified. The first is awareness of the manifold environmental factors that make the human relationship with the environment one of mutual dependence for health and well being. The second is the ability to seek and attain a balance among the social, economic, and biological elements of human environmental interactions. The third is knowledge of the environment as related to social, technical, and natural systems in normal function and when perturbed. The fourth characteristic recognized in the study is enhancement of decision-making as it relates to important issues affecting the future of the society.

The Environmental Education Act has been interpreted as affording support so that the nation's schools can enhance these four characteristics. The UVA study encourages school systems to assess their present performance on the basis of these. The specific terms of environmental policy and social need that constitute local and regional goals will figure in any such assessments. Educational programs already fulfilling these aims are only of general interest to the Office of Environmental Education, as it is not primarily a review body. Where gains in the performance of social support systems remain to be realized through learning about human settlements and technology in the environmental setting in which they function, the Federal Government should continue to provide resources to do that job and place them at the disposal of communities and their schools. The eventual result, recommended in one of the UVA study reports, should be "the broad and complete institutionalization of environmental education throughout the nation."

The UVA study recommends a process for the development of environmental education programs to enlist diverse elements of an educational system in the community setting. This would include elements from the formal and the informal education sectors. A series of steps was envisioned that could be regarded as a model for cumulative changes in the educational enterprise. It was advocated that different sites and units of instruction be recognized as elements of a "learning system design" which can gradually be refined, either in practice or through periodic review. Local initiative is stressed as the primary key to success.

The design should accomplish an infusion of ideas and methods into education so that social and individual learning result and effects can be measured through better decisions in society's interest. Activities at field study centers or other learning sites can be assessed for the part they play in the design, and future plans for the region should enter the formal education process as elements to be explored. The design should present options for the development of environmental education activities in terms of an options profile (described in detail in one of the project reports), in which choices about future directions become clearly visible to educators and civic interests.

A central accomplishment of the UVA study was to articulate a structural model for environmental education with seven "cells" into which desired learning outcomes and all specified activities carried out under the Act could be entered. While these activities serve individually to train teachers or result in understanding of human-environment interactions, they reflect, collectively, progress within the school system, community, or region, toward capabilities desired for environmental education on a continuing basis.

A central difficulty in meeting the aims of environmental education has been that the context in which benefits of awareness and understanding are sought is at least as large as the social, economic, and ecological future of a region. Few projects have been fully regional in scope and these tended to be more oriented toward the present than to the future. The majority of past projects reviewed focused on matters related to single issues as manifested in a single locale, a small part of a geographic entirety. Many educators rightly insist on treating those local or functional aspects that students can see at first hand, or about which they are best prepared to learn in the classroom. In order to be as educationally effective as they can be in the present, teachers and auxiliary persons disengage from the holistic and regional dimensions needed for optimal goal achievement.

The UVA study, in its descriptive analysis of environmental education, made visible the difficulty just cited. How could teachers working in particular subjects or community representatives concerned with some one issue enlarge the educational scope, while continuing to provide effective educational services?

Fulfilling the Aims of Environmental Education

The need to link individual units of instruction or a single issue with a more embracing context closely resembles a difficulty common in all design practice. The functions of individual components must be improved step by step, while overall performance can be measured only in system terms. The UVA study suggested that approaches to overcoming this difficulty that have been found useful in design practice hold promise in developing learning systems. Institutions that have pioneered in methods for "collective inquiry" that are widely used in other settings were asked to apply such methods to environmental education.

One method that enables people to establish how parts of complex systems are related is called "interpretive structural modeling (ISM)." Innovative methods of idea generation are applied to list as many individual elements as those involved can identify. Following discussion to clarify, to eliminate duplication, and to gain general understanding of the elements, the next step is to consider and select some well-defined relation as it may apply to all possible pairs of items listed. The relation chosen might be "is a partial cause of," so that participants could vote in the exercise according to how they perceive various events to be causally related.

A subject that was considered in this way in one of the project reports was the use of land in the vicinity of urban centers. By subjecting each feature of the issue to a process of assessment in which each person votes after discussion of the relationship involving a given pair of elements, a structure gradually emerges to reflect judgments in the aggregate derived from different special outlooks, such as food production, development concerns, topsoil runoff, and population pressures.

"In the process of deciding whether the relation holds between two elements, the group often develops an improved definition or understanding of the elements or the relation," comments the report on collective inquiry methods. "They also gain a better understanding of other participants' views about the elements or the values, beliefs, or perceptions of other participants. These improved understandings are among the main beneficial outcomes of collective inquiries."

Another procedure, called the "nominal group technique (NGT)," is useful in eliciting individual written answers to questions about specific components. It relies on facilitated discussion to identify interrelationships, followed by anonymous voting to achieve shared judgment.

One of the collective inquiry techniques reviewed for its utility in environmental education was the "charrette," a group design procedure often used in architecture. The study discussed a charrette employed to plan land use in the Shawnee National Forest in Illinois. In Columbus, Ohio, the Battelle Memorial Institute and A. T. and T. collaborated in an assessment of community expectations for the public school curriculum that involved 1,700 people. The study also commissioned a trial of a variety of the collective inquiry methods on a range of environmental issues within the Tennessee Valley Authority region, and evaluation disclosed that they were highly rated for contributing to solutions of concrete problems in planning and decision making.

"Learning about one's environment encompasses a large number of factors," the study reported. "Understanding all these factors, their interrelations, and their implications for managing the future cannot be done alone. Involvement in collective inquiries with other participants with a variety of skills, knowledge, experiences, perceptions, and values is required."

A belief that technology and environmental quality are at odds with each other has contributed to the impression that environmental issues remain impossible to resolve. The educational counterpart to this impression is that while the schools can teach the appreciation of nature or can confer an understanding of the complexities of our industrial society, they cannot integrate the two forms of knowledge.

The University of Dayton, the University of Illinois, the University of Northern Iowa, Vanderbilt University, as well as the Far West Laboratory for Educational Research and Development and other collaborators with the University of Virginia in the environmental education study have demonstrated that collective inquiry methods may serve communities in formulating designs for environmental education. Where the separate emphases of fields of study have tended to fragment the educational enterprise, the interrelationships throughout the human-environment complex may exert an integrating influence in discussions among community representatives, environmental groups, industrialists, and educators.

The principal process recommendation of the study is that collective inquiry methods be instituted at the community level. Where communities and school systems have been impeded by differences in outlook and approach among different educational fields or differences among the professional functions of segments of the community, group processes using the collective inquiry methods are recommended as powerful learning means, helping to maintain progress toward better integrated programs in the future.

The overall conception of environmental education provides for a system perspective. There are seven cells in the structure. (1) Planning is accompanied by the development of (2) delivery systems and support. Both contribute to (3) learning system design. (4) Personnel development may be necessary as a preliminary to (5) the learning activities that occur, leading to (6) learning outcomes. All feed into the judgmental process of (7) evaluation, which also feeds back into (1) planning.

A regional framework can be chosen because it is the focus for decision, because most social support systems are regional in scope, or because ecologists and geographers are accustomed to analyze interactions on a regional basis. "A 'region', in our design concept," comments one of the study reports, "is defined as the largest territory of common concern of a functioning pattern of human settlements which has the greatest opportunity to match problems and potentials with resources--whether or not there is presently a unified regional government. A regional perspective strengthens the opportunity to consider the long-range impacts of current actions; match the scale of the decision process to the scale of the problems; create integrated solutions to problems such as transportation, housing, water, waste disposal, energy, and land use; consider the social and economic impacts of changing the physical environment; provide for feedback from citizens to other policymakers; and to make appropriate use of science and technology."

Given that the major natural geographic regions of the country are ecologically distinct, by virtue of climatic and resource differences, they can serve as frames of reference within which to develop the model recommended in the study. One of the benefits of doing so would be ready transferability of instructional resources within each region, where agriculture, aquatic and marine biology, land use and water quality, and other matters affected by climate are fairly uniform.

Since many environmental issues are resolved by assigning different weights to variables, solutions might be general within any one region. Participants in the study looked upon regions as helpful contexts for evaluations of educational accomplishment. The Office of Environmental Education could support the development of instructional materials suitable for use within each region by encouraging proposals from school systems, universities, community groups, and professional organizations. Adoption and use of the materials elsewhere in the region would remain subject to local option. Regional resource centers and regional meetings would afford opportunities to share and assess mutual interests and achievements.

The recommendations in favor of regional environmental learning systems reflect a judgment that widely used design procedures make it feasible to develop programs in this way. One of the most significant aspects of procedures recommended is their readiness for implementation. Workability and effectiveness of the approaches are emphasized. Underlying every workable design is a body of compatible knowledge brought to the design by the participants, through the local initiative process. "It is clear that design has not been a significant concern in educational research and development," the study observes. Using best available knowledge, and building upon the realities of present systems are standard practices in professional approaches to design which many efforts to introduce innovations into education have disregarded. So is follow-up, "for infusing the design in a region and . . . for evaluating the design once it is in place."

Considerable effort is given to the description of graphics to convey understanding of complex system processes without extensive verbal descriptions. Throughout the study imagery was sought that might communicate effectively with community leaders and educational administrators. Communities that do not have their own "map" for environmental education might well diagram their present efforts according to the seven-cell model and decide which areas need to be emphasized more in the future. Collective inquiry methods can serve to translate discourse among educators and civic leaders into design for regional environmental learning systems.

The Office of Environmental Education has served as a source of support for extensive resource development and trials of instructional programs encompassing the full range of human-environment interactions. A shift toward regional objectives requiring several years to plan, to develop personnel, to design learning systems, and to create delivery and support systems would require change in the pattern for the administration of support. The study served to encourage consideration of more comprehensive, multi-year projects by the Office and also levels of funding closer to the full authorization set by the Act.

Overcoming the shortcomings that remain in environmental education will require us to surmount a number of institutional and conceptual hurdles (Institutionalization of Environmental Education). The study suggests that environmental education could enter a new phase of fruitful service and constructive accomplishment. The best index of the need to continue in this direction is to be found in the number of environmental issues that will perplex men and women in America until we have learned how to solve them.

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APPENDIX: ENVIRONMENTAL EDUCATION PROGRAM DESIGN RESOURCES

The University of Virginia Center for Participative System Design, supported by the U.S. Office of Environmental Education, and assisted by several subcontractors, developed a set of environmental education resources. The design and development of these resources were based on a conception of environmental education that is consistent with the Environmental Education Act of 1970 (P. L. 91-516, and subsequent amendments, including P. L. 93-278 and P. L. 59-561), namely that environmental education should:

- focus on and clarify the complex relationships existing between natural and human systems, and examine the many aspects and interdependencies of both;
- use information from a variety of fields and disciplines (including the natural sciences, social sciences, and humanities) in order to deal adequately with the ecological, social, aesthetic, economic, technological and cultural dimensions of environmental issues; and
- emphasize problem-solving and decision-making by presenting real environmental problems or issues that have local, regional, national, or global significance. It should engage learners in values clarification, problem-solving, planning, and decision-making activities that prepare them for dealing with environmental problems and issues that affect individuals and society.

RESOURCES

Resources are of several types, suitable for various target audiences. They range from resources for strategic planning for environmental education to mathematics problems suitable for eighth-grade classes.

A. Moving Ahead in Environmental Education (ED 193 007)

This essay discusses the future of environmental education in a philosphical vein and suggests design approaches for the future of environmental education.

B. Designs for the Future of Environmental Education (ED 196 713)

This is the final, summary report on the UVA Project. It organizes the results of the study, and connects other project reports to specific topical areas. Some self-paced learning materials are included to provide depth in selected areas.

C. Descriptive Analysis of Environmental Education (ED 173 172)

The project report presents a basis for a descriptive analysis of environmental education, distinguishes formal and informal environmental education, assesses compatible and mutually supporting roles for formal and non-formal environmental education, compares environmental education with a normative model (see D), and discusses some strategies for change.

This report is primarily for general audiences with other reports furnishing more detail.

D. An Integration of Normative Models for Environmental Education (ED 183 358)

This project report synthesizes a structure for environmental education consisting of seven major parts: planning, learning systems design, personnel development, learning activities, delivery systems and support, evaluation, and learning outcomes. Each of these parts is structured in detail, to furnish an integrated map of environmental education.

The sources of the map elements are given, and the method of developing the map is explained.

The report should be useful to persons who want to see an overall organizational framework for environmental education.

E. Learner Readiness for Environmental Education

This report, developed under a sub-contract to the Far West Laboratory for Educational R & D, reviews the current status of learning and developmental theory, and the connection of this work to curriculum design. The implications of the present state of knowledge for the conduct of environmental education are given.

This report should be valuable to persons concerned with personnel development, curriculum development, and learning system design.

F. Conceptual Basis for the Design of Regional Environmental Learning Systems (RELS)

This report is intended as a thought piece to help illuminate the idea of a "Regional Environmental Learning System." The RELS concept offers a model for how to think about developing environmental education through local initiative.

While this report is oriented toward the general reader, in its later chapters it begins to focus upon learning systems design.

G. Sourcebook for the Design of Regional Environmental Learning Systems (RELS)

This is a report in six volumes. Building on the work reported in C, D, E, and F, which is presumed to have been studied as background, these volumes offer ideas, methods, and initial models for local design and implementation of a RELS.

- Volume 1 - Overview. (ED 187 567)

  The Overview volume places the Sourcebook in focus, describes the contents of succeeding volumes, discusses major issues in environmental education and proposes responses to them, presents a pyramidal set of definitions of environmental education ranging from a "popularized" definition set forth in D, and outlines approaches and strategies for carrying out environmental education.

- Volume 2 - You Create a Design. (ED 187 568)

  This volume develops in detail a mission for environmental education, explores the design of a learning system from a political perspective, discusses how conceptual system design can be carried out, and discusses the relation of projects to the Environmental Education Act of 1970.

  The important role of facilitator in learning systems design is described in the Appendix.

  This volume is intended for use by education innovators.

- Volume 3 - Creating a Regional Environmental Learning System. (ED 187 569)

  This volume addresses the networking aspects of learning system design, with particular application to informal environmental education. It also is relevant to establishing good linkages between formal and informal environmental education.

- Volume 4 - Conducting Collective Inquiry. (ED 187 570)

  This volume explores alternative ways of conducting environmental education through an inquiry mode The inquiry mode of learning is thought to have the greatest promise for environmental education, because of the need to learn through information sharing. Several tested means for conducting collective inquiry are described. Appendices contain full descriptions of computer software that can be used to help facilitate the organization of complex issues. With the aid of a skilled facilitator, this software can be a major aid in learning, as has been demonstrated in numerous settings, including high school.

- Volume 5 - Evaluating a Regional Environmental Learning System. (ED 187 571)

  This volume is primarily for persons who are novices in evaluation, but who are interested in seeing that evaluation gets done. Various cases are given as examples for focusing and illustrating evaluation ideas and philosophies. Numerous techniuqes and methods for evaluation are set forth, possible resource persons are identified, and a bibliography is given.

- Volume 6 - Content-Oriented Resources. (ED 187 572)

  Two different kinds of problem sets are offered for use in the eight grade mathematics curriculum. These stress environmental issues, and range from very simple problems in arithmetic to more sophisticated structuring problems.

  The use of collective inquiry methods is developed in the context of a thematic approach to the study of human settlements. The materials shown here are illustrative of how environmental education can be developed thematically in the formal system, as a way of preparing persons for effective citizenship in their communities.

H. A Partial History of the Environmental Education Act

This report is a collection of items relating to the history of the Environmental Education Act of 1970. It is thought that this partial history will be of interest to persons who are seeking an understanding of the federal role in environmental education, and a feeling for how the Environmental Education Act has influenced environmental education.

I. Abstracts of Grant Products

Over 700 projects were sponsored under the Environmental Education Act during the years 1971-77. Nine reports contain material aimed at abstracting the results of these projects. The contents of the several reports are as follows:

- 1977 Grant Materials Descriptions
- 1976 Grant Materials Descriptions
- 1975 Grant Materials Descriptions
- 1974 Grant Materials Descriptions
- 1973 Grant Materials Descriptions
- 1972 Grant Materials Descriptions
- Additional 1972 Grant Materials Descriptions and 1971 Grant Materials Descriptions
- Audio-Visual Materials Descriptions
- Regional Materials Analyses for 1971-76

AMERICAN MAGAZINES AND THE ENVIRONMENTAL MOVEMENT: SYMBIOTIC RELATIONSHIP, 1966-1975*

A. Clay Schoenfeld

The role of the media in the environmental education of the "public at large," so to speak, has been investigated and discussed by many in the recent past. Here, the chairman of the Center for Environmental Communications and Education at the University of Wisconsin-Madison, also a past president of the National Association for Environmental Education, presents a ten-year history of interrelationships between magazines and the environmental movement along with some cogent thoughts as to the continued development of the environmental communications field.

> Periodical files furnish an invaluable contemporaneous history of their times. . . . The researcher investigating social currents . . . finds invaluable aid in the various periodicals. . . . Where is there such a record (of the course of popular ideas) as we have in magazine files?--FRANK LUTHER MOTT.[1]

Were Dr. Mott still writing his monumental history of American magazines today, he might very well document his thesis by linking the irruption in magazine environmental content in the decade 1966-1975 to the simultaneous widespread public recognition of "environmental pollution as a social problem,"[2] and to concomitant sweeping governmental environmental management initiatives. In that period over 70 specialized environmental periodicals came into being in the United States; all but 10 per cent continue in existence today. Over 30 English language environmental journals published abroad circulated here. An older generation of conservation magazines took on an environmental tilt. Each state experienced its own irruption in environmental newsletters and bulletins. Environmental articles became a staple in many general circulation magazines. There may be no clearer example of the symbiotic relationship of social currents and magazine enterprise in America.

The Genealogy of Environmental Magazines

The principal roots of the specialized environmental magazine appear to be three. First, the nature study/outdoor recreation/conservation genre. Second, the professional natural resource management genre. And third, the science/technology genre.

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Genre No. 1 first appeared with the publication of national periodicals like *American Sportsman* (1861), *Forest and Stream* (1873), and *American Angler* (1881). Such writers as George Bird Grinnell and Emerson Hough used their pages not only to delineate the basics of sporting etiquette but to play an active role in early movements to conserve wildlife, forests, and parks.[3] The *Sierra Club Bulletin* (1893), *American Forests* (1895), and *Audubon* (1899) were the house organs of the first voluntary groups devoted to the study and conservation of mountain wilderness, forests, and birds, respectively. In the same genre are such more recently established periodicals as *National Parks and Conservation Magazine* (1926), *Living Wilderness* (1935), *Conservation News* (1936), and *Outdoor News Bulletin* (1956).

Representing Genre No. 2 are *Auk* (1884), *The Journal of Forestry* (1902), *Parks and Recreation* (1903), *Journal Water Pollution Control Federation* (1928), *American Institute of Planners Journal* (1935), *The Journal of Wildlife Management* (1937), *The Journal of Environmental Health* (1938), *The Journal of Soil and Water Conservation* (1946), *Air Pollution Control Association Journal* (1951), *Our Public Lands* (1951), *Solid Waste Management* (1958), and *Natural Resources Journal* (1961). While *JEH* signified the first appearance of the term "environmental" in an American magazine title, the word did not carry today's connotations; the *JEH* was devoted solely to the concerns of the National Association of Sanitarians, just as *Environmental Engineering* (1962) circulating from England devoted its pages exclusively to heating and air conditioning technology.

Scientific American (1845), *Science* (1880), *Ecology* (1920), *BioScience* (1951), *Limnology and Oceanography* (1956), and *Journal of Environmental Sciences* (1958) are representative of Genre No. 3. Here again the use of the term "environmental" in the name of the *JES* did not carry a modern connotation. In the 1950s, environmental scientists in such fields as meteorology, plant and animal ecology, and geochemistry would never have considered sociology as in any way an environmental science,[4] yet under the impact of the environmental movement some sociologists have come to call "environmental" sociology "a new paradigm,"[5] and the newer *Environmental Science and Technology* actively solicits articles by social scientists.

The Connotation of "Environmental"

What indeed are the basic ideas implied by the use of the term "environmental," particularly in contrast to yesterday's "conservation?" A panel of ecologists has distilled some key tenets:[6]

In locus, the fouled, clogged arteries of the city quite as much as scarred countryside. In scope, a comprehensive, interrelated humankind-environment-technology system. In focus, global environmental impacts of crisis proportions threatening the well-being of all humankind on an over-crowded planet. In content, tough ecological choices, not easy unilateral fixes. In strategy, long-range impact analyses and rational planning. In tactics, grass-roots participation in resources policy formation--in the streets and through institutional channels. In prospect, a necessary reliance on alternative sources of energy. In philosophy, a commitment to less destructive technologies and less consumptive lifestyles. In essence, a recognition of pervasive interdependencies, that everything is connected to everything else--what Perlinski has called "the principal intuition of the 20th century."[7] In substance, an applied ecology, an "environmental" approach to "the system of interrelationships among society, economics, politics, and nature in the use and management of resources."[8]

The Emergence of "Environmental"

In the 1960s, faced with energizing public awareness of what were early identified as "the four P's"--pollution, pesticides, population, and people's habits--applied ecologists apparently sought a compelling phrase or phrases that would signify a new, comprehensive approach to what Aldo Leopold had called a "man-land ethic." Steadily there emerged "environment," "environmental," "environmentalist"--each of them old technical terms adapted to new, popular purposes.

A reconnaissance of newspaper, periodical, and book indexes and other reference data has suggested that the early chronology of environmental terminology featured books, journal articles, government reports, convention speeches, and specialized publications. In time, "the environment" and related terms increasingly entered the mass media lexicon as a means to label the new way of looking at humankind-habitat relationships:

1959 Raymond Dasmann introduces the term *Environmental Conservation* as the title of a text.

1962 A *Natural Resources* report to the President by the National Research Council speaks of "an integrated approach to the problems of the human environment."

1963 Political scientist Lynton Caldwell writes "Environment: A New Focus on Public Policy." Stewart Udall's U.S. Department of the Interior annual report is titled *Quest for Environmental Quality*.

1964 Educator Mathew J. Brennan speaks to the American Nature Study Society on "Education for the Total Environment."

1965 Symposia reports appear on *Future Environments of North America* and *Restoring the Quality of the Environment*.

1966 Resources for the Future publishes *Environmental Quality in a Growing Economy*.

1967 The American Academy of Arts and Sciences devotes an issue of its journal (Daedalus) to "America's Changing Environment."

1968 Barry Commoner's Scientist and Citizen magazine is restyled Environment.

1969 Congress passes a landmark National Environmental Policy Act. Time introduces an "Environment" section. The New York Times appoints an "environmental reporter."

1970 Fortune devotes an entire issue to "The Environment: The National Mission of the 70s." Earth Day sends environmental coverage mounting in newspapers and on TV.

1971 Environmental issues lead the list of editorial topics in the press. Walter Cronkite introduces a special "environment" segment on the CBS Evening News.

1972 Sociologists Riley Dunlap and Richard Gale say "environmental quality" has entered the consciousness of the general public as "a social problem."[9]

The Specialized Magazine Irruption[10, 11]

Hand in hand with the general emergence of the environmental movement in the 1966-1975 decade came that remarkable irruption in numbers of new American specialized environmental periodicals. The following representative chronology suggests something of the breadth and depth of the phenomenon:

1966 Bulletin of Environmental Contamination and Toxicology, Journal of Outdoor Education

1967 Atmospheric Environment, Environmental Research, Environmental Science and Technology, The Futurist, Pesticides Monitoring Journal, Water Research

1968 Land Use Digest, Limnos

1969 Environment and Behavior, Environment and Planning, Environment Monthly, Journal of Environmental Education, Journal of Leisure Research, Oceans, Pollution Engineering, Remote Sensing of the Environment, Sierra Club National News Report, Thoreau Journal, Water Spectrum

1970 *Aware*, *Critical Reviews in Environmental Control*, *Catalyst for Environmental Quality*, *Environment Action Bulletin*, *Environmental Law Review*, *Environmental Quality*, *Environment Report*, *Environment Reporter*, *Environmental Action*, *Environmental Law*, *International Journal of Environmental Studies*, *Mosaic*, *Mother Earth News*, *Not Man Apart*, *Smithsonian*, *WasteAge*

1971 *Clear Creek*, *Citizens' Bulletin*, *Ecology Law Quarterly*, *Ecology/Today*, *Environmental Affairs*, *Environmental Future*, *Environmental Law Reporter*, *International Wildlife*, *Journal of Environmental Systems*, *102 Monitor*

1972 *Environmental Quality and Safety*, *Family Planning Digest*, *Human Ecology*, *Journal of Environmental Quality*, *Man on Earth*

1973 *Costal Zone Management Journal*, *Energy Policy*, *Energy Sources*, *Energy Users Digest*, *Environmental Comment*, *Environmental Education Report*, *Equilibrium*, *Geothermal Energy*, *Journal of Environmental Management*, *Solar Energy Digest*

1974 *Columbia Journal of Environmental Law*, *Environmental Ethics*, *Environmental History*, *Journal of Environmental Economics and Management*

1975 *Chemecology*. *Energy Reporter*, *The International Journal of Energy*, *Environmental Geology*, *Journal of Environmental Science & Health*

There might have been more American environmental periodicals if some ecological niches, so to speak, had not been occupied by distinguished English language journals published in other countries but circulating widely in the U.S. For example:

England *African Environment* (1974), *Applied Energy* (1975), *Biological Conservation* (1968), *Clean Air* (1929), *Ecologist* (1970), *Energy World* (1973), *Environment and Change* (1972), *Environment and Planning* (1969), *Environmental Pollution* (1970), *Environmental Pollution Management* (1971), *Family Planning* (1963), *Journal of Animal Ecology* (1932), *Journal of Applied Ecology* (1964), *Journal of Ecology* (1913), *Oryx* (1903), *Society for Environmental Education Journal* (1968), *Water Pollution Control* (1901)

Netherlands *Agriculture and Environment* (1974), *Agro-ecosystems* (1974), *Meteorology* (1970), *Ecological Modelling* (1975), *Hydrobiological Journal* (1969), *Landscape Planning* (1974), *Resource Recovery and Conservation* (1974), *Science of the Total Environment* (1971), *Urban Ecology* (1975), *Water/Air/Soil Pollution* (1971)

Russia	*Atmospheric and Oceanic Physics* (1965), *Soviet Journal of Ecology* (1970)
Sweden	*Ambio* (1972), *Tellus* (1949)
Canada	*Canadian Field Naturalist* (1879), *Nature Canada* (1972), *Water and Pollution Control* (1893)
Japan	*Ecological Review* (1935), *Population Ecology* (1952)
Italy	*Ceres* (1968)
Switzerland	*Environmental Conservation* (1974)
India	*Family Planning News* (1960)
France	*Impact of Science on Society* (1950)

The Environmentalization of Older Journals

One might hypothesize that, in the case of a social current like broad-gauged concern for environmental quality, it would be specialized periodicals that would set the agenda for general audience publications. Just the opposite seems to have been the case. Analyzing the content of *Environment* and *Audubon* on the one hand and *Time* and *Saturday Review* on the other, 1959-1979, Strodthoff found that "message variables for general audience channels were more precipitous and less sustained than those for the special interest channels, which tended to be more gradual and protracted."[12]

For more documentation that the antecedent "conservation" magazines were slow to reflect the newer environmental concepts and subject matter, take their coverage--or rather, lack of coverage--of the National Environmental Policy Act (NEPA) during 1968-70.[13]

NEPA is uniformly regarded by adherents, foes, and scholars alike as a landmark act. With pardonable pride of sponsorship, Sen. Henry Jackson termed NEPA "one of the most significant steps ever taken in the field of conservation." Joseph Fisher later praised it as "the most comprehensive legislative statement of the nation's . . . commitment to protect the environment," one which has had "a profound impact on agency decision-making." T.T. Finn says "no law has done more to make the federal government sensitive to environmental values," penetrating the bureaucratic structure "like a whiplash" to force "early consideration of ecological factors in federal decision-making."

In passing NEPA the Congress had five major purposes in mind: to mandate federal agencies to protect and restore environmental quality in accordance with a general national policy, to establish specific action-forcing procedures for the implementation of that policy, to create a Council on Environmental Quality in the Executive Office of the President, to foster the development of information on and indices of environmental quality, and to provide for an annual CEQ report of progress toward NEPA's goals.

In the presence of such sweeping legislation, one would assume its evolution and passage would have been followed meticulously by existing specialized prototype environmental magazines. Not so, a content analysis of 1969 issues of seven such periodicals has shown.

Environment did not mention NEPA. Neither did Science. In the Sierra Club Bulletin, the April issue reported the Club's John Muir Award had just gone to Senator Jackson, but there was no mention of his NEPA role. The July SCB made passing mention of "several bills providing for the creation of an environmental council," but the October issue did not place NEPA on the Club's list of "priority conservation projects" even though its Washington representative had testified at a NEPA hearing.

The Outdoor News Bulletin on June 6 devoted space to Congressman Dingell's charge that "the complex of environmental quality will require a new mechanism of federal agencies," and on June 18 the Bulletin recorded some Congressional attention to S 1075 and HR 6750. Then, nothing more until NEPA had passed. The Conservation News for March 15 carried a "National Wildlife Federation call for Congressional action on environmental issues," but did not include NEPA. The July 1 issue made minor mention of S 1075 and HR 6750 among "other legislation" awaiting Congressional action. An October 1 roundup of "limited conservation accomplishments" in Washington indicated that S 1075 was "tied up in a jurisdictional squabble, with its final fate uncertain." Reporter Louis Clapper did write that, if passed, "this bill can be an important keystone in an entirely new approach toward maintaining quality in the environment," but the federation itself conducted no mobilizing campaign on behalf of NEPA in the columns of its organ. (Clapper has since called NEPA "a real sleeper.") In Audubon's "National Outlook" column, Charles H. Callison in July gave a rundown on pending NEPA-type bills, all of them predicated on the belief that "both the executive and legislative branches of the federal government are ill-structured to attack the (environmental) problem." In September Callison mentioned passage of S 1075 by the Senate. Never was an "Audubon View" editorial devoted to NEPA, even though Callison had personally testified at a NEPA hearing, and even though a 1972 Audubon article would later term NEPA "the first effective environmental law of the land."

It was the fact that older journals were initially not receptive to environmental material which seems in part responsible for the rise of so many new specialized environmental periodicals. Take, for example, the case of The Journal of Environmental Education. Beginning in 1964, a number of professors of education and of journalism and their graduate students around the country were studying the interrelationships of public schools and of the mass media and environmental concerns. But their research reports were not deemed sufficiently significant by existing scholarly journals. So 33 entrepreneurial scholars founded The Journal of Environmental Education in 1969, "devoted to research and development in ecological communications." Within six months the new periodical had a paid circulation of 1,200, and continues to flourish today. Meanwhile, the Journalism Quarterly, for example, gradually recognized the salience of environmental subject matter. Between 1969 and 1979 the JQ published 21 papers in the environmental area.[14]

Why were the older conservation magazines slow to catch the cadence of environmentalism? Put another way, why was it that general interest magazines and not specialized periodicals helped set America's environmental agenda in the 1960s?

Over the years each specialized magazine had identified a narrow segment of the conservation cause as its particular mission in life and had cultivated a rather small but highly supportive clientele. Much of environmentalism's sweeping table of contents seemed irrelevant or peripheral. To the editors and readers of American Forests, for example, there didn't seem to be much connection between forest conservation in the Northwest and Walt Disney's plan to build a big jetport near Miami. Yet within roughly four weeks in the late summer of 1969, Time, Newsweek, Life, and Look all carried major environmental stories on the proposed jetport and its threat to South Florida's water budget.

That everything is indeed connected to everything else was a lesson that had to be learned by the classical conservationists the hard way. Later the head of the National Wildlife Federation would come to say, "Conservation is no longer just the story of vanishing wildlife and vanishing wilderness areas. There is a new urgency in the work now. Suddenly, as we stop and look at our total environment, it has taken on the meaning of human survival."[15]

It is also possible veteran conservation magazine editors in the 1960s sensed their older, more conservative readers would be alienated by too hearty an espousal on the part of a traditional magazine of environmentalism's somewhat subversive doctrines and highly participatory if not militant tactics. Audubon magazine, for example, "dear to New England gentlefolk and retired admirals," as Hodgson describes it,[16] probably could not have risked assuming a leadership role on any issue more inflamatory that saving the bald eagle. By the 1970s, after even Richard Nixon had said that "wealth and happiness are not the same thing," a good deal more genuinely environmental an editorial policy became possible and even desirable, given a new breed of Audubon society member.

A Case History in Creeping Environmentalism

How environmentalism has gradually penetrated older magazines may perhaps be best examined by analyzing in detail the changing content of a typical representative of the nature study/conservation genre, National Wildlife, sponsored by the National Wildlife Federation, the largest organization of its type in the world.

The December-January 1966 cover said National Wildlife was "dedicated to the wise use of our natural resources," the definition of conservation propounded by Glifford Pinchot 60 years before. The issue featured an innocent illustrated article on "Wildlife in Our Christmas Legends," and "An Inspirational Message from Dr. Norman Vincent Peale." The Reverend Dr. Peale asked us to "love God's law" by "experiencing the magic of nature daily." We could do so even in the city, he said: "One morning industrialist whose plant discharges waste, the apathetic citizen who is not willing to pay for clean water, the alderman whose city discharges untreated sewage." This was no mellow voice from Walden Pond; it was a call to arms. So it was no coincidence that the April-May 1970 issue saw a change in National Wildlife's slogan to "Dedicated to Improving the Quality of the Environment." The lead article was an interview with Professor Paul Ehrlich, apostle of population control, arguing that "Man is the endangered species."

Under Editor John Strohm's theme, "The Do-Or-Die Decade," the June-July 1970 issue took on the mining lobby in Idaho, land developers in Africa, and the Bureau of Reclamation in North Dakota. The next number carried an expose about how "We're Making a Cesspool of the Sea," by U.S. Senator Gaylord Nelson, one of the first politicians to discover environmentalism was good politics; and an open letter from Tom Kimball to President Nixon, pointing out that "$75.5 billion for national defense and only $1 billion for environmental quality means our national priorities are out of whack."

The October-November 1970 National Wildlife was particularly memorable for the magazine's second "EQ Index," a multicolor 10-page spread heralding a message of pure environmentalism: "America is in trouble because our greed, apathy, and blind indifference to human values have put us on a collision course with disaster. Our second annual measure of national environmental quality reveals the sobering fact that we are still losing ground on almost every front. Our air is dirtier. Out water is more polluted. Lands for food, wildlife, and living space are deteriorating. Certain minerals may be exhausted. Surging population threatens environmental quality around the world." The answer: (1) "a bold and comprehensive national land and water use plan," and (2) "an informed and aroused public with a new ecological philosophy." To put teeth into the message, that issue of National Wildlife introduced a new section, the "EQ Critical List," a roster of those "crisis areas needing immediate attention." Rating first mention were a nuclear plant in Alabama, a dam in Illinois, a seashore preserve in Oregon, and an oil refinery in Maine. Meanwhile the National Wildlife Federation was reported calling on Congress for more "money for waste treatment plants and the purchase of public lands." The little conservation girl with the May basket has disappeared into the mists of the past.

By 1971 environmentalism was really rolling in National Wildlife. December-January: Tom Kimball taking on the Public Land Law Review Commission for "putting one-third of the U.S. up for grabs." February-March: a farsighted question, "Are We Running Out of Fuel?" June-July: Ralph Nader saying "Students shouting obscenities aren't tearing down America. It's chemical plants, steel mills, coal operations, paper and pulp mills, and utilities that are tearing down the natural resources of the country." October-November: the third annual EQ Index, showing we had seemed to wake up to the real meaning of environmental quality and the interrelationships of energy, economics and ecology. Lead articles in August-September 1971 had covered William Ruckleshaus of the

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in New York between two appointments I stood for a long moment watching the ripples of the East River sparkling in the sunshine. The scene gave me such a lift that it affected the whole course of the day." No hint here that the river at the time was one of the most polluted in the world. Louis Clapper's "Washington Report" for the month recorded relatively minor Congressional actions on parks, wild rivers, and recreation areas. There was a lead article titled "What Can I Do in Conservation?" but the accompanying photographs suggested your most important contributions could be to "pick up litter," "build a birdhouse," "show your nature photographs," and "let your newspaper editor know" about something or other.

In April-May 1966 the National Wildlife Federation announced its current "National Conservation Award Winners." Plaques went to a Seattle conservationist for work on better outdoor recreation facilities, a U.S. Senator for supporting national recreation areas, a newspaper columnist for writing about game management principles, a President's wife for fostering beautification, and an industrialist for landscaping his plant grounds. They were all very nice people doing very nice things. No hint of the type of tough heroes just over the next hill. This was indeed still the era of a type of conservation which E. Sydney Stevens at the time characterized as like "a little girl in pantalettes with a May basket in her hand." The October-November 1967 issue of National Wildlife listed the sixty articles carried that year. All but fifteen were devoted to birds, mammals, natural history, adventure, plant life, inspiration, or outdoor activities. Of the fifteen on conservation, most were on mild wildlife issues.

Yet just beneath the surface of the magazine's major contents in 1966-67 were the first signs of the coming wave of the new environmentalism. The lead article in April-May 1966 was a blast at the nation's air pollution mess by Thomas L. Kimball, Executive Director of the National Wildlife Federation: "Air pollution may be our biggest pollution problem today. Two-thirds of the population of the United States lives in 7,000 urban areas afflicted with polluted air. Their lungs are gray instead of a healthy pink, and some of them will die, or have their lives shortened, from breathing the polluted air." No bucolic birdwatching here. The new conservation problem was urban and it threatened the human species itself.

In the same issue NWF President Ernest Swift, in his brief "Short Talk" column, saw the inexorable relationship between battle in Indochina and conservation in Indiana: "With an undeclared war on our hands, will the resources of our forests, mines, and farms once again be strewn and left to rot on every atoll in the Pacific?" Ernie did not live to see a new generation of college kids take to the streets against both the Vietnam war overseas and environmental degradation at home. But his words were prophetic. A couple of issues later Swift was inveighing against "certain public officials who, after a token effort (at preserving wildlands), wash their hands of their responsibilities and let the commercializers have their way." Again, Ernie was ahead of his time in foreseeing outdoor buffs loving parks and wilderness areas to death in the absence of the crowd controls he knew would be needed. The same December-January 1967 National Wildlife had a sleeper article about how a little old Wisconsin lady in tennis shoes took on a county board and a state conservation commission

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single-handed--and saved 4,800 acres of forest from axe and plow. Success stories of grassroots action like this were to come to characterize environmental coverage. What was to come was perhaps best foreshadowed by a report in the June-July 1967 National Wildlife from the 31st annual National Wildlife Federation meeting at San Francisco, where hundreds of oldline conservationists declared "contamination of our environment" to be "the most pressing problem of our time" and one that "demands massive and immediate action to prevent and control pollution." Conservation had come a long way from the day when the most pressing problem was the plume hunter.

"Are We Teaching Johnny Conservation?" was the question posed in the December-January 1969 issue to Martin W. Schein, Director of the prestigious National Science Foundation Committee on Undergraduate Education in the Biological Sciences. His answer was a resounding, "No!" With perhaps more prescience than he knew, he said what was needed was "a new concept to give the whole natural resource field a new life," and that "it may come from our urban ecologists." The same issue of National Wildlife told the story of how a new breed of environmentalist, the birdwatcher turned activist, had saved Delaware's wildlands by "raising money, buying up, setting aside, restoring." The money came largely from DuPont executives via their Wilmington Garden Club wives. The campaign was masterminded by that essential catalyst in the person of Ted Harvey, himself an expatriate from the world of business.

"A Call to Battle!" was the headline of an April-May story about NWF's annual meeting, accompanying a Gallup poll indicating "73 percent of Americans will pay more taxes to fight conservation problems." The June-July 1969 National Wildlife issue picked up the tempo with a feature on the "Outward Bound Adventures" of a new generation of Americans forsaking affluence for the boondocks, and a photo-editorial inspired by the Santa Barbara oil spill, asking "Can man afford to foul his environment?" Even more diagnostic of the changing wind were the year's "Awards for Conservation Achievement": to a radio personality for encouraging citizen action against environmental degradation, to a journalist for his coverage of pressing environmental issues, to a cabinet member for conspicuous contributions to environmental quality, to a women's league president for fomenting environmental action programs, to a U.S. Senator for an aggressive fight against water pollution.

It wasn't just the semantics that were different. A new wind was blowing, typified by "an extensive evaluation of our deteriorating environment" in the August-September 1969 issue--National Wildlife's first "National EQ" report card, anticipating the first annual report of the President's new Council on Environmental Quality. The same issue carried a warning article on how "DDT Threatens You!", not just peregrine falcons; and a report about a Citizens Crusade for Clean Water, a new-style consortium of unlikely bedfellows like conservation organizations, labor unions, consumer groups, professional societies, and local government officials.

In the February-March 1970 issue the editors took off their gloves for a haymaker at water polluters: "The politician who permits pollution to be legal, the farmer whose land drains off chemicals and silt, the new Environmental Protection Agency--"the man in the eye of the storm," the mercury poisoning "catastrophe brewing in quiet waters," the "last chance for a tall grass prairie" National Preserve, and the first of a series of "ecology primers." But the big news was in "Washington Report," now grown from a single column to a four-page center spread. "Federation Goes to Court in Four Corners Area," the story read, telling how the NWF had sought an injunction against a coal-burning power plant on Utah's Kaiporawits Plateau that would pollute multiple national parks, forests, and wildlands. Convention oratory had been replaced by court action. Five years later the power combine would call it quits at Kaiporawits.

By December-January 1972 the typical environmental hero had escalated to the governor of a state, as recorded in a National Wildlife story about how Russell Peterson of Delaware had "slammed the door in industry's face" when business sought to desecrate Delaware Bay. Governor Peterson was no ecology nut; he was a former DuPont vice president with a simple love of birdwatching. (He recently retired as Chairman of the federal Council on Environmental Quality to become President of the Audubon Society.)

The next month Tom Kimball introduced economic statistics to show that "spending money to cut pollution will produce big long-run savings." An April-May Gallup Poll indicated "the environmental movement is not faltering." Kimball was back in June-July with an open letter to Presidential candidates, urging them to "get on the environmental bandwagon." The same issue called for "a world-wide effort to conserve dwindling energy resources." And there was a piece by Chet Huntley predicting that the environmental movement was here to stay. The October-November Index of 1972 titles listed 23 out of 75 in the new categories of "Environment" and "Conservation Ethic."

As slow as was the acceptance of an environmental stance on the part of veteran nature/conservation magazines, it was measurable. Russell found a mounting concern with problems of the urban environment, for example, in three such journals. Twelve times as many such articles appeared in the 1963-69 period as appeared in the 1954-1960 period.[17]

The Flourishing of State Environmental Publications

Although very difficult to document, circumstantial evidence suggests that the irruption in national environmental periodicals was accompanied by an equally phenomenal rise in numbers and types of environmental periodicals within states. Zaporozec did a fairly exhaustive search in Wisconsin in 1971 and found 64 state-wide environmental occasionals, most of them newsletters or bulletins.[18] In Wisconsin today there are 251 sub-state environmental groups.[19] If half of them issue a periodic newsletter, plus the surviving statewide publications, that would give us some 175 environmental periodicals in Wisconsin--one for about every 2,500 persons. It is unlikely that that is the national average since Wisconsin is traditionally a conservation-minded state, but if it were the national average it would mean as astronomical number of environmental occasionals circulating in the United States.

The Rise of Environmental Content in General Magazines

Because variations on the terms "environment" or "environmental" were not used as cataloguing descriptors by either the Library of Congress or Reader's Guide to Periodical Literature before 1974, it is very difficult to measure precisely any change in content in general circulation magazines in the 1966-1975 decade. But what incidental evidence we have suggests a significant rise in that period in environmental content.

For example, nine principal magazines devoted cover stories to "the new conservation" in 1969-70:

Look	4 Nov 1969	America the Beautiful
Newsweek	26 Jan 1970	The Ravaged Environment
Life	30 Jan 1970	Ecology Becomes Everybody's Issue
Fortune	Feb 1970	The Environment: A National Mission for the Seventies
Esquire	March 1970	Our Country 'Tis of Thee, Land of Ecology
Time	2 Feb 1970	The Emerging Science of Survival
Sports Illustrated	2 Feb 1970	The Last Chance--Now
Saturday Review	7 Mar 1970	Environment and the Quality of Life
Psychology Today	March 1970	Hell 1970--Our Maniac Environment

Using a variety of descriptors, McEvoy determined from an analysis of Guide to Periodical Literature that the number of environmentally oriented articles in American magazines jumped from 68 in the period 1957-59 to 226 in the period 1967-69, an increase of more than 330 percent.[20] Articles on wildlife conservation alone more than doubled from 27 in 1971 to 55 in 1975.

Such data again suggest that general interest magazines responded more promptly than did specialized nature/conservation magazines to the impulses of the environmental era.

General circulation magazines continued to pay attention to environmental issues to a degree unheard of before 1966. For example, in the last four months of 1975, representative environmental articles appearing in general interest magazines included:

Conservation in Nepal, *Atlantic*; air pollution control programs, update on environmental legislation, *Business Week*; saving North Carolina's New River, *Christian Century*; the laws of nature, *Harper's*; powerline conflicts, *Nation*; Florida's exotic wildlife species, India's threatened wildlife, *National Geographic*; the energy situation, *The New Yorker*; environment and human behavior, *Psychology Today*; and inept conservation bureaus, *Sports Illustrated*.

Attrition in the Environmental Ranks

Five principal new environmental journals are now defunct.

Clear Creek, a flashy tabloid published in the shadow of San Fancisco Bay Bridge, sought to give environmentalism an irreverent counter-culture flavor in the image of the *Berkeley Barb*. It lasted a year and a half.

Environmental Quality was an attempt to cause the environmental current to float a slick general interest magazine in the image of its sponsor, *Psychology Today*. It, too, was short-lived, perhaps because it bit off more than its readers could chew, as this *EQ* mission statement indicates:

"The further we go, the more we realize the complicity of all things within the environmental scheme. We have amended our editorial objectives to include prison reform, free clinics, daycare child centers, mood music, invasion of privacy, wine and health, homosexuality, corporate priorities, and a new kind of automotive road test. But *EQ* will continue to aim at the paper industry, the politics of power plants, ecotactics, environmental studies, vanishing lands and species, population control, trash mashing, organic cemeteries, guides to citizen and consumer action, household industry, economic living, and personal ecology."[21]

Environment Action Bulletin performed a crucial service at a crucial time. The product of Rodale Press in Pennsylvania, it early on recorded the activities of environmental action groups around the country, providing an invaluable networking. Its mailing list survives in the hands of *Environmental Action*.

The Environment Monthly under its distinguished editor, John Housman, played an equally catalytic role both by needling some industries for their lack of any ecological conscience and by saluting other industries that adapted to the environmental current. The publication died with the retirement of its editor.

Ecology/Today had a momentary fling and then disappeared into the New England fog.

It may or may not be significant that the new environmental periodicals that failed were those that cast out a broad net for readers, while those that have survived have aimed at particular audiences much more modest in size yet more avid in their interest in various aspects of applied ecology. The generalized environmental magazines were vulnerable to competition from general circulation magazines; the specialized environmental periodicals are much less so. It is hard to see, for example, how even *Saturday Review* could have substituted for the uses and gratifications of subscribers to *The Journal of Environmental Education*, but *SR* could easily have supplanted *EQ* in the minds and hearts of environmental generalists.

The Environment of the Freelance Writer

The coming of broad environmental concern has represented a bonanza for freelance writers. In their acquired zeal to cover the environmental beat, almost all American general circulation magazines have become markets for accomplished freelancers. So have the new specialized environmental periodicals--but for prestige, not for pay. Many antecedent environmental magazines, on the other hand, have always paid for contributions and do so now, although not handsomely. The better markets seem to be *American Forests*, *Audubon*, *Environment*, *Field & Stream*, *International Wildlife*, *National Parks & Conservation Magazine*, *National Wildlife*, *Natural History*, *Outdoor Life*, *Ranger Rick's Nature Magazine*, *Sierra Club Bulletin*, *Smithsonian*, and *Sports Afield*. A few state magazines pay.

Summary

Tuesday, 22 April, 1970--Earth Day--represented "the largest, cleanest, most peaceful demonstration in America's history." Congress adjourned. Fifth Avenue in New York City was closed to traffic for two hours. Across the country an estimated 20 million people of all ages and shades participated--"dedicating themselves to saving the planet."[22] Sociologists Dunlap and Gale say E-Day "overnight elevated environmental quality into the public ken as a social problem."[23] The environmental movement "seemed to have become a true mass movement," in the assessment of current historian Hodgson.[24]

A hundred years from now, how could an historian know that? By analyzing American magazines, 1966-1975. The evidence is easily discernible--in the appearance of many new specialized environmental periodicals, in the adaptation of antecedent magazines, in the domestic circulation of periodicals from abroad, in the contents of general circulation magazines, in fugitive state newsletters and bulletins. As Mott postulated, the social current of environmentalism and American magazine enterprise were to share a symbiotic relationship in the decade under consideration.

Did the environmental impulse sustain itself in American society? The answer to that question would seemingly be revealed by an examination of American magazines--1976-1985.

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SECONDARY SCHOOL UTILIZATION OF COMMUNITY COLLEGES AS A LEARNING RESOURCE CENTER*

Jerry L. Smith

Cooperative educational ventures between pre-college and post-secondary educational institutions frequently is a matter of in-service courses for teachers and/or guest speakers for school classes. This report, by Jerry L. Smith of Charles County Community College of La Plata, Maryland, details an effort of that institution in making its facilities and staff available to local secondary schools on a somewhat more extensive level. It was presented at the National Conference on Meeting Environmental Workforce Needs, sponsored by the U.S. Environmental Protection Agency and organized and conducted by Information Dynamics, Inc., in Washington, DC, in February 1981.

The energy crisis of the seventies has brought many changes to the American scene. The American educational system has not been spared from these changes. As the cost of fuel becomes a major factor in daily decision-making, so does energy cost become a factor in the choice of universities, colleges and technical schools that commuting students may attend.

The axial concept of the community college developed in the sixties and seventies has taken on new dimensions in this decade, to develop ways that will educate the public as to the resources available on a local basis.

One such method is to provide a service or need that will "draw" the public to the college. This is opposed to "recruitment technique" that requires many hours of personnel time, travel expense and may reach a relatively small number of people. The following program was developed by the Charles County Community College's Pollution Abatement Technology Division to educate the general public of facilities in the Division and to increase its role in the education complex of the County. The College has offered its resources, both instructional and physical, to the development of high school age, gifted and talented students. Through the coordination of the high school science program and the College, many young minds have been motivated and challenged into scientific careers. Based on previous experience the following suggestions might be instrumental in helping initiate a cooperative program.

**In Meeting Environmental Workforce Needs: Determining Education and Training Requirements. Silver Springs, MD: Information Dynamics, Inc., 1981, pp. 304-307. (ED 205 802). Reprinted by permission of Information Dynamics, Inc.*

Program Initiation

- Invite the area high school science teachers onto the campus.
- Familiarize the teachers with the instructional staff and their areas of expertise.
- Develop a list of the physical equipment at the College's disposal, what it can and cannot do, and a practical overview on how it works, including time requirements for such procedures as standardization and development of calibration curves.
- Encourage teachers to have their students draft a written outline of the research to be done. Included should be a hypothesis, a step-by-step explanation of the procedures to be followed, equipment and materials to be needed, a time frame for each phase and library research to be completed prior to the actual commencement of the experiment.
- Contact the science department in the proper field and set up an appointment between the teacher, student and one of the instructors. During the meeting the instructor will advise the teacher and the student what role the College may play in the project.
- A schedule will be drawn up that will allow time that is mutually convenient for teacher, student and instructor. Teachers should be informed that they must "always" accompany the student except when it has been mutually agreed upon by the teacher and instructor. Liability requires that an adult be present during any experiment. The demands and responsibilities of an instructional staff seldom will permit their continual presence.

Objectives of the Program

The overall objective of the program is to familiarize the community, schools and student body with the potentials of a scientific career. Specific objectives are:

- to introduce high school faculties to the opportunities that exist at community colleges
- to provide expertise and advisement to gifted and talented students
- to develop rapport between secondary and collegiate personnel
- to provide contact between students and the scientific community
- to expose students to college life and opportunities
- to increase awareness between college and high school personnel as to the curriculum and needs of each institution
- to help coordinate student transition from high school to college academics.

Program Description

It is requested that the teacher accompany the student at every visit. As students work in a college laboratory, it has been found that many of their questions can be more easily answered by their teacher, who is more familiar with the student's previous background than is the college instructor. Instruction and explanations of various aspects of theory are quickly and easily assimilated by the teacher who may then exploit his rapport with the student to develop the desired goals. This helps maintain student confidence levels in their classroom teacher while providing a new resource for the teacher.

Introduction to sophisticated equipment and techniques, as is available at the college, may proceed at the rate perceived by the classroom teacher. As the classroom teacher gains confidence in instrumentation and procedures, other students may be incorporated into the program without the concerns of over-taxing college instructional personnel. The degree of sophistication of experiments and equipment are only limited by the ability level of the student and the time limitations of the classroom teacher and instructor.

Selection of Students

Selection of students participating in the program is two-fold. The classroom teacher must keep in mind the vigorous academic program that would be expected of participating students, and selection should be based on previous records and experience indicating the desired achievement levels.

The college instructor will base his selection on what he feels the student will need as a subject base or background to be successful in his or her project.

Numbers of Students Participating

The number of students participating in the early phase of the program would, out of practical considerations, be small. As the classroom teacher plays an increasingly important role in the actual supervision of research, the college instructor could assume strictly an advisory role. The knowledge gained by both teachers and students in this program would eventually trickle back into the secondary classroom to the benefit of more students than could actually be incorporated in the college program.

Cost in Time and Materials

It has been the college's experience that most programs do not involve significant expenditures. Careful review of the drafted research proposal will indicate costs, and if they are excessive, the student will have to be asked if he or she wishes to continue the reseach at his/her own expense.

Time factors are a serious limiting factor in the scope of this project. It is for this reason, as well as others mentioned above, that the classroom teacher must accompany the student. As the teacher becomes more experienced, the breadth and scope of the program may increase proportionally. College instructional time decreases on a per student basis as the program gains experience and longevity.

Evaluation of the Program

Long term evaluation cannot be accomplished until the student records of academic achievement and career choices can be ascertained.

Short term objectives are immediately apparent. Immediate rise in student enrollment is noted with a direct correlation between involved schools, cooperating teachers and students in the program. Intangible results such as public image, parent and community awareness are less readily measured but appear to be significant. Improved curricula and teacher backgrounds are inevitable though indirect results.

Summary

In a decade of decreasing young population, enrollments and public tax support, institutions with innovative approaches will not only survive, but grow and prosper. Cooperative programs with high schools offer a unique opportunity to help our emerging generations to make career choices and obtain successes that might otherwise be left to chance. The future belongs to those who are not hesitant to mold it.

AN EVALUATION OF THE ENERGY EDUCATION CURRICULUM PROJECT MATERIALS IN INDIANA ELEMENTARY SCHOOLS*

Victor A. Smith and Kathleen R[illegible]y Lane

During 1978-79, the Division of Curriculum of the Indiana Department of Public Instruction, supported by the Indiana Department of Commerce Energy Group, undertook a project to develop, disseminate, and evaluate energy education materials for grades K-6. An Energy Curriculum for the Elementary Grades was developed to be used primarily with social studies and science classes. This curriculum consisted of 18 lessons for each of three levels: grades K-1, grades 2-3, and grades 4-6. The evaluation report below was prepared by Indiana DPI's Coordinator of Curriculum Research and Evaluation and an Energy Education Consultant.

The project followed a cyclical development process of testing and revision as synthesized in Schaffarzick and Hampson (1975). Evaluation was a process that occurred throughout the development process incorporating both formative and summative dimensions. The main purpose of the evaluation activities was to provide information for decision-making and to assess the effectiveness of project decisions. Although the efforts described in this paper drew on traditional evaluation models, the context of the project was a major factor in determining the direction of evaluation activities (Steele, 1977).

The purpose of this paper is to report on the evaluation of this project. The objectives of this evaluation were twofold:

1. to formatively evaluate the lessons to provide further direction for development and revision, and
2. to summatively evaluate the use of the materials by teachers and the impact of the materials on students and teachers.

The Energy Education Curriculum Project was a statewide effort by the Department of Public Instruction supported by the Indiana Department of Commerce Energy Group. The project staff coordinated the publication, dissemination and inservice training components of the project along with the evaluation efforts reported in this paper. The lessons themselves were developed under contract by a team from the Social Studies Development Center at Indiana University headed by Dr. Judith Gillespie.

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Four main goal areas were reflected in the objectives for An Energy Curriculum for the Elementary Grades: awareness, information, inquiry skills and habits of participation. Awareness goals included interest, recognition and concern about energy resources, uses, and problems. Information goals included knowledge about human and physical resources, actions and outcomes. Inquiry skills included asking good questions, gathering evidence, valuing, and identifying future trends and alternatives. The goal of participation habits included improving consumer habits and citizen participation habits in energy decisions.

Collectively, all of the lessons at each level were designed to reach the goals of awareness, information, inquiry skills and habits of participation. Each lesson consisted of a rationale, objectives, learning activities, and a variety of stories and illustrations designed to appeal to students at all levels. Each lesson also included teaching suggestions or adaptations for use in math and language arts instruction. Each chapter of each unit concluded with assessment activities.

The energy education materials were designed to be used flexibly. Each lesson was outlined in rather rich detail with some sequential development. However, because the lessons provided a variety of activities along with adaptations for grade levels other than those addressed, elements of teacher discretion and decision-making were built into the materials.

An Energy Curriculum for the Elementary Grades was designed to be a voluntary and supplemental program which could be integrated into current school programs, thus meeting an urgent and timely curricular need.

Concurrent to the evaluation efforts reported in this paper, dissemination and inservice activities also took place. As of January, 1980, 12,000 individual units were disseminated in Indiana, throughout the nation and to foreign countries such as Malaysia, Israel, Great Britain, Canada, Australia, Venezuela, France and Colombia. Approximately 3,000 Indiana elementary educators have attended regional or local inservice sessions to learn about An Energy Curriculum for the Elementary Grades and to participate in implementation planning. The primary inservice effort related to this study was a series of ten initial dissemination workshops held in the fall of 1978. These regional workshops, attended by 324 educators, were designed to introduce project materials.

Evaluation Design

An evaluation design was developed which focused on both formative and summative dimensions. The audience for the formative evaluation was the development team. The audiences for the summative evaluation were expected to include funding agencies, school boards, school administrators, classroom teachers, energy educators, and the general public.

The design of the formative evaluation involved two techniques used in an iterative procedure: review by an interdisciplinary panel and classroom pilot testing. Based on the conceptualization paper which guided the project, the developers were to prepare the first draft of Unit One lessons. The panel composed of consultants with backgrounds in elementary education, early childhood education, science education, social studies education, environmental education, home economics, and evaluation would then read the lessons and meet with the developers to share their critiques of the procedures, activities and content of the lessons. The panel also included a representative of the Indiana Energy Group who was in charge of education activities for that office. Based on this evaluation, the developers would then revise the lessons and prepare several prototype lessons for classroom pilot testing. Due to the tight time schedule, pilot testing was scheduled for summer school. After hearing the pilot teacher assessments, lessons were to be revised and submitted again to the panel for final review before publication. The same cycle would be followed to formatively evaluate the lessons in Unit Two and Unit Three. Again, because of the tight timeline, cycles to develop the three units would necessarily overlap, with work beginning on Unit Two as Unit One was being revised. The repetitive framework of review and classroom testing was designed to provide the developers with as much formative data as possible in preparing useful, accurate and workable lessons for elementary classrooms.

The design of the summative evaluation involved two data sources: teacher questionnaires and student measures. Participants in the initial dissemination workshops held in the fall of 1978 would complete a questionnaire about energy education and also a workshop evaluation form. Teachers from this group would be sent a follow-up questionnaire in the spring of 1979 to determine the level of use of the materials and the perceptions teachers had of the materials after using them.

Secondly, the impact of the materials on students would be studied in the spring of 1979 in a pretest/posttest treatment/control design. Teachers who had attended the initial workshops and who represented a variety of grade levels and geographic settings would be sought to participate in the study.

Thus, a design organized around formative and summative evaluation was projected. Further details about the implementation procedures and the results of each phase are discussed below.

Formative Evaluation: Procedures and Results

Implementation of the formative evaluation procedures occurred basically as outlined above in the statement of the design. The review panel representing eight viewpoints met regularly with the development team as drafts for units were prepared. After revisions prompted by the panel critiques, lessons were tested in several classrooms. Seeking pilot teachers during summer school presented some difficulties and contributed to a smaller sample than had been planned. Twelve participating teachers in six Indiana cities completed a lesson response form about each lesson taught. They also completed a general response form pertaining to the entire set of prototype lessons they used with their students. Due to slippage in the time schedule, lessons for the final unit were pilot tested early in September during the beginning of the new school year. Discussions were held between each pilot teacher and project staff either through personal interviews or by telephone. Results of these discussions and the written teacher responses to the lessons and to the general approach were given to the development team to assist in the revision process. The questions included in these forms were prepared jointly by the project staff and the development team in order to address the concerns of all parties.

In addition, students in some classrooms completed a pretest and a posttest in connection with the lesson trial. A quickly devised assessment form was used which included questions about the awareness, information, inquiry skills and participation of students. The effort was included in the pilot testing in order to provide a rough preliminary judgment of the effectiveness of the lessons with students.

As a result of the formative evaluation, the draft materials were substantially revised. Initial classroom tests involving teacher responses and student assessments indicated that the lessons were not appropriate for younger students or for lower ability students because of the difficult reading level and the heavy conceptual load. This, in addition to numerous suggestions by the review panel, resulted in a complete reconceptualization of the content and sequencing of the energy lessons. Instead of basing each of the three units on a theme, with suggested adaptations for different grade levels, each unit was reformulated to be age specific, with Unit One designed for grades K-1, Unit Two designed for grades 2-3, and Unit Three designed for grades 4-6. This fundamental change in the materials resulted from an interaction of data received from both elements of the formative evaluation, the review panel and classroom tests.

The elementary teachers participating in subsequent pilot tests of the reformulated Unit Three indicated that the approach was now on the right track. In addition, assessments completed in two classrooms showed some encouraging changes between pretests and posttests. For example, students expressing a greater than average interest in studying the energy problem jumped from 36% to 56%. Those who thought they should know "a lot" about the energy problem increased from 57% to 78%. Those who knew that coal is a fossil fuel changed from 25% to 64%. The fact that "most oil comes from the Middle East" was recognized as true by 32% before the lessons and by 71% after the lessons. Before the lessons only 49% agreed that "We may not use cars as much because of energy problems," whereas 80% agreed after the lessons. Time did not permit either validation of the instrument used, testing in large numbers of classes, or elaborate use of the results. Instead, the brief assessment and results with a few classes were used by the developers as simply one more piece of evidence useful in deciding how to revise the materials.

The diverse backgrounds represented on the review panel proved to be very helpful to the developers in revising the materials. Conflicts often arose between subject matter specialists (science, social studies) and age-level specialists (early childhood and elementary) regarding the appropriate content and methodology of the lessons. The joint meetings of these specialists and the developers provided a forum to reconcile several different points of view and suggest mutually agreeable guidelines for the developers to use in revising materials. In hindsight, the succession of meetings with the review panel played an indispensible role in the creation of useful lessons within the tight time schedule.

Summative Evaluation: Teacher Outcomes - Procedures and Results

Implementation of the summative evaluation procedures to assess teacher outcomes involved the use of three questionnaires. Items from the three instruments were used to answer five evaluation questions related to teacher use and perceptions of the materials:

1. Were materials about energy viewed by workshop participants as something needed for their teaching situations?
2. Did the materials leave a positive first impression on those attending the initial dissemination workshops?
3. To what extent did workshop participants use the materials?
4. To what extent did the lessons fulfill the need for energy materials expressed by participants at the initial dissemination workshops?
5. Were teachers personally enthused about using the lessons?

The first questionnaire, used to answer the first evaluation question stated above, was administered as the opening activity at each of ten regional energy education workshops held in October and November, 1978. These initial dissemination workshops sponsored by the Department of Public Instruction were intended to introduce the project and to acquaint teachers and administrators with its goals and activities. The 324 workshops participants responded to a question about the need for energy materials, in answer to the first evaluation question, along with several other questions asked for other purposes. Later in the program, participants were given twelve sample lessons, four from each unit, to examine and discuss. It was hoped that teachers would try the lessons with their students and subsequently try more of the lessons when the entire publication was completed and distributed.

At the end of each workshop, participants completed a workshop evaluation form which had fifteen Likert-type questions along with some open-ended questions regarding first impressions of the materials. A total of 306 participants completed the evaluation form.

The last three evaluation questions were explored using data from the third questionnaire, a follow-up survey mailed in May, 1979, to the 258 classroom teachers who had attended the fall workshops. An identical second questionnaire was mailed to home addresses in June to all teacher participants who had not returned the first questionnaire. A total of 154 (60%) of the teacher participants returned the survey.

Questionnaire Development

The first questionnaire was designed by the research and evaluation coordinator from the Division of Curriculum and a professor from the School of Education at Indiana University-Bloomington who was interested in and knowledgeable about energy education. The two questions of interest on this questionnaire related to the perceived need for energy materials, as specified in the first evaluation question.

The workshop evaluation form was designed by the research and evaluation coordinator in consultation with the energy education consultant. A Likert-type format was used which was consistent with the format generally used in the Division of Curriculum for evaluating inservice workshops.

The follow-up questionnaire was designed by the energy education consultants and research and evaluation coordinator from the Division of Curriculum with input from the professor involved in the first questionnaire. Fifteen items assessing use of and perceptions about project materials formed the data base for answering evaluation questions 3-5 stated above.

Both the first questionnaire and the follow-up questionnaire went through several revisions and were then pilot tested by several consultants in the Division of Curriculum, some of whom were familiar with the project and others who were not. A final revision based on these trials was made before using the questionnaires.

Limitations

There were several limitations to this part of the study. The primary limitation was that the information was gathered from three self-report questionnaires. Direct observations of classrooms for a lengthy period of time would have provided more objective assessments of actual use of project materials. Secondly, since the third questionnaire was mailed to participants, it is likely that those who returned the questionnaire had more positive responses about use of the materials than those who did not return the instrument. Also, since time constraints did not allow more than one follow-up, the return rate of 60% on the mailed questionnaires was not as high as possible. The respondents to the questionnaires voluntarily attended an inital dissemination workshop. Therefore, the results cannot be generalized to all teachers who received the energy materials but did not attend a training session. Finally it should be remembered that teachers completed the follow-up questionnaire based on the use of the twelve sample lessons distributed at the initial workshops. The entire set of fifty-four lessons in An Energy Curriculum for the Elementary Grades was distributed during the follow summer.

Results

Three data collection efforts were described above which related to the evaluation of the use of the materials and the impact the materials had on teachers. Results will be reported in the context of the evaluation questions related to these three efforts.

1. Were materials about energy viewed by workshop participants as something needed for their teaching situation?

   Participants at the dissemination workshop were asked, "To what extent do you need materials to help you teach about energy?" Of the 316 respondents, 75% replied "greatly needed" and another 22% replied "somewhat needed." Only 2% answered "slightly needed," and 1% answered "not needed at all." These responses came predominantly from educators who had little previous experience teaching energy lessons before. Of the 322 answering a question about previous use of energy lessons, 30% had not taught any before and 48% had "taught a few lessons on energy." Only 6% had "taught an energy course," and 16% had "taught many lessons on energy but not an energy course." Thus, these project lessons were being presented to educators who preceived a great need for energy materials but who were largely inexperienced in teaching about energy.

2. Did the materials leave a positive first impression on those attending the initial dissemination workshops?

   Those attending the workshops in the fall of 1978 answered five questions on the workshop evaluation form which reflected their first impressions of the materials. A total of 306 participants completed evaluation forms. Agreement with the item was defined as a response of either "agree" or "strongly agree" on the five-point Likert-type scale. Responses to all five questions pointed to a positive impression.

   A large majority of participants agreed that "these lessons fit in with the curriculum in our school" (77%), that "these lessons would go over well in our community" (74%), and that "these lessons seem easy to understand and use" (89%). In addition, 93% agree that "it would be easy to try out a few of these lessons in my school," and 90% said they "plan to use the lessons in my class or school." Clearly, the materials made a positive impression during the one-day introductory workshops.

3. To what extent did workshop participants use the materials?

Several items on the follow-up questionnaire described the use of the materials. Of the 154 returning the mailed questionnaire, 63% reported that they had taught at least four of the sample lessons, the maximum number available for their grade level. Another 12% had used from one to three lessons, while 25% had not used any lessons.

When asked about the time spent teaching the sample lessons during 1978-79, a similar picture emerged. A total of 56% spent four or more hours with the lessons, while 25% reported they spent one to three hours and 19% reported zero hours.

The largest number of teachers (34%) reported that they used the sample lessons as combination social studies and science lessons. A number almost as large (31%) replied that the lessons were primarily used for teaching science, and another 21% reported primarily using them to teach social studies. On the question asking in which subject area lessons were taught, only 11% answered "none."

The lessons had suggested ways that activities could be adapted to teach mathematics and language arts. Results from the follow-up questionnaire indicated that these adaptations were seldom used. Only 4% reported using the math adaptations with four or more lessons, 21% used them with one to three lessons, and 75% reported they did not use the math adaptations. The language arts adaptations were slightly more useful to teachers: 7% used them with four or more lessons, 36% used them with one to three lessons and 57% reported no use. Thus, while a large majority reported using the lessons in teaching science or social studies, only a small minority made use of the mathematics and language arts adaptations.

4. To what extent did the lessons fulfill the need for energy material expressed by participants at the initial dissemination workshops?

As described earlier, participants at the initial dissemination workshops had expressed a great need for materials about energy. Several questions on the follow-up questionnaire reflected on the degree to which these materials fulfilled that perceived need. On these questions, respondents answered using a seven point scale ranging from "Definitely No" (1) to "Definitely Yes" (7). Responses of 5, 6, or 7 were considered to indicate some degree of agreement. Using this procedure, 77% agreed to some degree that "the goals of the Energy Education Curriculum Project lessons" were "in line with the major curriculum goals of your district." Similarly, 83% agreed to some degree that the lessons were appropriate for the abilities of their students, and 84% agreed that the lessons were relevant to the backgrounds of their students. When asked if they are likely to use these energy lessons next year, 91% agreed. Clearly, these materials are at least partially fulfilling the perceived need.

Further evidence of this was found in responses to the question, "During this past school year, have you requested or ordered instructional materials about energy other than materials from the Energy Education Curriculum Projects?" Many suggestions for other materials were included in the workshops and a bibliography of instructional materials was later mailed to each participant, so it was somewhat surprising that only 43% reported that they requested other materials. The other 57% either felt that these lessons filled their needs or else lacked the time, money or initiative to secure other materials. Whatever the reason, the result seems to be that among a group that expressed a great need for energy materials, over half requested no other materials besides An Energy Curriculum for Elementary Grades. While 86% of those who used the lessons modified them for their situation, this seems to be an implementation strategy rather than an expression of disinterest since over 90% of the respondents indicated they are likely to use the lessons during the next school year.

Two additional responses by the 102 teachers who had used the sample lessons provided further evidence that the materials met the need for lessons which are effective with students. First, when asked, "Have the energy lessons affected the energy attitudes of your students?", 86% agreed to some degree, including 10% who replied "Definitely Yes." Similarly, 90% agreed to some degree that students reacted favorably to the energy lessons, including 25% who answered "Definitely Yes."

Thus, these results provide generally strong evidence that the lessons fulfilled a need for materials which were perceived by teachers to be appropriate to student backgrounds and abilities, which aligned with the district curriculum, and which were effective with students. In short, they fulfilled a need for materials which teachers would use.

5. Were teachers personally enthused about using the lessons?

Two additional questions on the follow-up questionnaire reflected the personal feelings teachers had about the materials. First, teachers who had taught the lessons were directly asked, "Did you enjoy teaching the lessons from the Energy Education Curriculum Project?" A total of 95% responded positively, including 31% who replied "Definitely Yes."

Secondly, respondents were asked if they shared any of the materials with other teachers at their school. The largest number (22%) responded "Yes, with the entire staff." Sharing with five to ten others was reported by 6%, with three to four others by 19%, with two others by 20%, and with one other by 17%. Only 16% reported that they did not share the materials with other teachers. Thus, both questions reflected positive responses toward the materials by a large majority of teachers, with around 30% expressing the most enthusiasm in teaching the materials and in sharing the materials with other people.

Summative Evaluation: Student Outcomes - Procedures and Results

As part of the summative evaluation of the project, consultants of the Division of Curriculum planned to conduct a study of the effectiveness of the project materials with students. It was also felt that the Indiana Energy Group was interested in seeing firm evidence that the project was meeting the goals that had been set. Therefore, an impact study was conducted to assess student growth as a result of studying six lessons from An Energy Curriculum for the Elementary Grades. The study was designed to measure the results of the project materials as objectively and accurately as possible. The specific research questions to be answered by this study were as follows:

1. Did students who studied the energy lessons differ significantly from comparison students on the knowledge test?
2. Did students who studied the energy lessons differ significantly from comparison students on the attitude measure?
3. Did students who studied the energy lessons differ significantly from comparison students on the participation measure?

To answer these questions, a study was designed which would allow comparison between students who studied the lessons and those who had not. A pretest/posttest, treatment/control design was employed. Six teachers used six lessons with their students between the tests, while six other teachers gave the tests, but did not teach any energy lessons.

Sample Selection

Six teachers who attended the Fall workshops and who had indicated an interest in participating in the evaluation study were selected to participate. Two teachers from different locations participated in the study of each level: K-1, 2-3, and 4-6. For each of these teachers, cooperating teachers were found at the same school and grade level, and their students provided a control group for comparison purposes. Locations were selected so that urban communities selected ranged in size from Indianapolis with a population of over 710,000 to Whiteland with a population of 2000.

In May, 1979, the six teachers taught six lessons from An Energy Curriculum for the Elementary Grades to their students after giving a pretest. The comparison teachers also gave a pretest, but did not use the energy lessons with their students. After approximately four weeks, the same test was given to all 289 students as a posttest.

Measurement Instruments

The two energy education consultants and the research and evaluation coordinator of the Division of Curriculum designed the measurement instruments.* After carefully examining the lessons, it was decided that the awareness, information and inquiry skill domains were cognitive areas which could be assessed on a knowledge test utilizing both recall and application items. Habits of participation could be assessed through self-report items on energy conservation practices. It was also decided to include items to assess attitudes about energy and energy conservation since this seemed to be a prerequisite to habits of participation.

Regarding the measure of participation used in the study, it should be noted here that self-report questions to measure participation are at best an inferior substitute for actual observation of behavior. Teachers did report observing behavior changes during the study; for example, some students began using both sides of the paper for coloring. However, the paper-and-pencil self-report on participation was written in an attempt to systematically collect information about how all students in the study participated in energy conservation activities. The unknown accuracy about self-reports must be remembered as a limitation in the measurement of participation.

Items were written to specifically address content found in the six lessons to be taught by the teachers in the study. Different items were devised for each level, resulting in three separate tests composed of 20 items, 30 items, and 40 items, respectively. A panel of consultants from the Division of Curriculum then assessed the content validity of the instruments, leading to a thorough revision. The three instruments were tested in their final form with children and adults unfamiliar with the program to see if the items and directions were appropriate.

Time did not permit a full pilot test to check instrument reliability. Therefore, reliability statistics were computed using the responses of students participating in the study itself. Alpha reliabilities were found to be higher for the upper grades than for the younger students, as seen in the table below.

TABLE 1

ALPHA RELIABILITIES BY UNIT AND MEASUREMENT SCALE*

	Unit One	Unit Two	Unit Three
Knowledge	.31	.60	.77
Attitude	.36	.69	.59
Participation	.29	.78	.77

*Data include both pretests and posttests.

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*Special acknowledgement is due to Margaret Van Gundy of the Division of Curriculum for her help in designing the instruments used in this study.

The lack of student familiarity with energy concepts reported by the kindergarten and first grade teachers undoubtedly reduced reliabilities. To help determine the influence of conceptual understanding on reliabilities, a separate analysis in Unit One pretests and posttests was completed for the demonstration students only. Pretest reliabilities of -.15, .31, and .20 for knowledge, attitude, and participation scales, respectively, rose on the posttest to .43, .65, and .44. Comparison student reliabilities averaged .20 on the pretest and .27 on the posttest. It seems clear that the clarification of energy concepts by studying the lessons inproved the consistency of students responses, thereby raising the reliabilities. This point is also an indicator of the effectiveness of Unit One lessons.

The small number of items was another probable cause of low reliabilities of the Unit One test. The twenty items (scales of ten items, five items, and five items) will be increased in future uses of the test.

An indication of the construct validity of the attitude and participation scales was found using factor analysis. When all attitude and participation items were included in one factor analysis, the attitude items clustered on different factors than the participation items, indicating that two different constructs were being measured. With the exception of a very few items, this was true of the measures in all three units.

It was concluded on the basis of this evidence that, keeping the noted limitations in mind, the measurement instruments were adequate for the purposes of this preliminary study.

Implementation

The energy education consultant met with both teachers at each location to explain the tests, directions, procedures and purposes of the study. The teachers administered the pretests to their students. Two weeks following the pretest, a call was made to each teacher to see if there were any concerns or problems. At the conclusion of the four week period, the consultant picked up the posttests, which had been administered by the teachers. Each teacher who used the lessons with the students was asked, "Did you teach at least one activity from each lesson, or if not, which ones did you omit?" All participants responded that they had taught at least one activity from each lesson. One teacher gave the consultant picture posters the students had drawn, and another showed a bulletin board and gave extensive notes to the consultant. Participants had suggestions for improvement in the tests and materials which indicated a familiarity with the impact of the lessons on students.

Limitations

Several limitations to this study should be kept in mind. Due to the press of time, a limited number of teachers and students participated in the study. Too few classes participated to allow the preferable technique of using classrooms as the unit of analysis. Students were the unit of analysis throughout the study. Also, as mentioned earlier, teacher volunteers were selected on the basis of locational variety rather than by a random selection. Therefore, we can not generalize the results to all teachers.

The evaluation instruments that were specifically designed for this study could not be pilot tested prior to their use; therefore, reliabilities were unknown. Subsequent use in the study revealed low reliabilities for K-1 students on the Unit One test. Although reliabilities were found to be higher among the K-1 students who studied the lessons, as discussed above, these weak reliabilities must be kept in mind when considering the results.

A further limitation is found in attempts to validate that the lessons were taught as requested in participating classrooms. Personal conversations with the participating teachers indicated that all lessons were taught; further evidence of implementation was cited above. However, without systematic observation, little is known about the depth, intensity, or comprehensiveness of the instruction provided. Similarly, comparison class teachers agreed to avoid teaching about energy during the time of study, but observational evidence again is lacking to confirm that energy was not discussed in the comparison classes. The effects of the drop in Iranian oil production and of a threatened gasoline dealers boycott during the time of the study may have prompted spontaneous instruction about energy in comparison classrooms.

Finally, because of the short duration of the study, time was insufficient to teach all eighteen lessons available at each level. Six lessons were selected for study. Therefore, caution should be used in interpreting the results of this study. The full effects of teaching all eighteen lessons await further study.

Results

Results of this study will be described by answering the three research questions in the order that they were described earlier. All analyses were completed using students as the unit of analysis.

1. Did students who studied the energy lessons differ significantly from comparison students on the knowledge test?

   To answer this question, change scores were analyzed using analysis of covariance, with the pretest scores as the covariate. This procedure allows us to statistically equate the pretest scores of all students and then compare the change scores from pretest to posttest.

This comparison revealed that students who studied the energy lessons did significantly better than comparison students on the knowledge posttest. These significant differences in favor of the demonstration classes were found for Unit One ($p<.01$), for Unit Two ($p<.001$), and for Unit Three ($p<.01$).

Thus, a strong, positive impact on knowledge was found as a result of using the energy lessons. Furthermore, this positive impact was pervasive across all three units tested.

2. Did students who studied the energy lessons differ significantly from comparison students on the attitude measure?

Again, changes in attitude scores were analyzed using analysis of covariance. The comparison of adjusted posttest scores revealed a positive impact on student attitude scores as a result of using the lessons from Unit Two. The difference in favor of the demonstration classes was clearly significant ($p<.01$). No such difference was found as a result of using Unit One or Unit Three. Lack of differences in Unit One may be explained by the general reliability problems discussed earlier. Thus, while no pervasive impact can be claimed as in the case of knowledge, the potential for positive impact on attitudes was demonstrated by the significant increase in attitude scores among students studying the selected lessons from Unit Two.

3. Did students who studied the energy lessons differ significantly from comparison students on the participation measure?

The same statistical analysis used for the knowledge and attitude tests was carried out for the participation test. No significant differences were found in the participation measure as a result of studying any of the three units. This finding may be more related to the difficulty of measuring participation in the manner attempted than to the lack of influence of the lessons on student behavior. Problems of measuring participation with paper-and-pencil self-reports were discussed earlier.

It should be noted that an interesting correlation was observed between the attitude and participation measures for all students taking the test. Using the Pearson correlation procedure, attitude and participation scores were found to be significantly correlated for both demonstration and comparison classes, for both pretests and posttests, and for all three units. These correlations, five of which exceeded .50, can be seen in Table 2 below. The table also shows that among demonstration students, the average correlations went up between pretest and posttests, while among comparison students, the average correlations went down between tests. This indicates that students who studied the materials experienced an improved alignment between

attitudes and participation. This is in contrast with the deterioration in the match between attitudes and participation noticed among the comparison students.

TABLE 2

PEARSON CORRELATIONS BETWEEN ATTITUDE AND PARTICIPATION SCORES

	Demonstration Students			Comparison Students	
	Pretest	Posttest		Pretest	Posttest
Unit One	.40**	.48***	Unit One	.66***	.27*
Unit Two	.57***	.38**	Unit Two	.64***	.35**
Unit Three	.27*	.52***	Unit Three	.44***	.55***
Average Correlation	.41	.46	Average Correlation	.58	.39

* $p<.05$
** $p<.01$
*** $p<.001$

Conclusions and Significance

From the formative evaluation, it was concluded that the iterative procedure of panel review and pilot testing together produced beneficial results. In hindsight, the effects of the combined evaluation methods seem greater than the influence of either method taken separately. The interaction between the two activities resulted in clear specifications for revision of the preliminary materials. Although the two processes proceeded separately, information was gained from two different groups in a mutually reinforcing and timely manner. Others involved in early stages of curriculum development might consider this iterative procedure when there are serious time constraints.

Another benefit of this procedure was suggested by Welch (1979) in a review of science curriculum development efforts. He stated that results of classroom try-outs of new science materials had little effect on subsequent versions. Rather, decisions on revisions were based on debates among project staff who were usually scientists. He concluded that this limitation in the formative evaluation process explained the generally high difficulty level of most, if not all, of the newer curricula. Hopefully, the combination of two approaches has led to energy materials with more realistic expectations for students.

Given the constraints of time and money inherent in most development projects, it was concluded from this study that the formative evaluation efforts were more beneficial than the summative efforts. While the summative evaluation provided some evidence of the effectiveness of the materials, the formative evaluation provided information that immediately resulted in substantial changes. From a practical point of view, it would have been difficult to start the development process anew even if the summative results had been disappointing. Others would be well advised to give high priority to formative efforts since the impact on the actual materials is much greater.

The questionnaires used to study teacher outcomes were designed to provide a broad, rather than a deep, look at the use of the materials and at how teachers perceive the materials. Several conclusions can be drawn from the results:

1. The materials made a positive first impression at the initial demonstration workshops, an impression which was subsequently fulfilled as teachers used the lessons.

2. The materials met a perceived need expressed at the initial dissemination workshop for energy materials to use in the classroom. Teachers generally felt that the materials fit their curriculum, were appropriate to the backgrounds and abilities of students, were interesting to students, and influenced attitudes about energy.

3. The lessons were used by a large majority of those who were introduced to them at the initial workshops. The adaptations for mathematics and language arts, however, were used by only a small minority of teachers, with language arts ideas being used more than mathematics ideas. The reasons for this can not be determined without a further study using interview techniques.

4. A large majority of responding teachers enjoyed using the lessons and shared the materials with several other teachers.

The use of three questionnaires to study teacher outcomes was a broad effort to ascertain the use of materials by all teachers attending the workshops. While this approach appeared to be a useful means of drawing general conclusions, it did little to improve understanding of the actual day-to-day implementation processes in classrooms. A companion study of teacher implementation utilizing interviews and classroom observations is needed to answer questions such as, "What kind of lesson modifications were made by teachers?" or "How did teachers sequence lessons for use with students?" This type of study would add a dimension that cannot be adequately captured by questionnaires.

While the student impact study was small and had a number of limitations as described earlier, some encouraging conclusions were drawn about the potential usefulness of An Energy Curriculum for the Elementary Grades:

1. Studying the energy lessons resulted in a significant gain in energy knowledge. This gain was consistent for all three units. Thus, the lessons appear to be very useful in helping students learn about energy and energy problems.

2. Studying the energy lessons resulted in a significant gain on the attitude measure for Unit Two. While this gain was not found for the other two units, we can conclude from the experience with Unit Two that studying the energy lessons can potentially develop more positive energy attitudes among students.

3. While studying the energy lessons had no general impact on the participation measure, an improved correlation was found between attitudes and participation as a result of studying the lessons. Among comparison students, in contrast, the correlation between attitudes and participation decreased over the period of the study. Thus, studying the lessons may be an influence to help students align their attitudes with their participation in the areas of energy.

The results of the student study showed an encouraging degree of effectiveness with students. While further studies with larger numbers of classes would help answer several lingering questions, considerable evidence was available in this study which would recommend the use of these lessons by elementary educators who wish to teach about energy in their classrooms.

Overall, the predominantly positive results seen in both the teacher outcomes and the student outcomes lead to the general conclusion that the formative evaluation efforts were effective. In addition, the positive results related to both teachers and students provide broad evidence that the energy materials can be useful tools for teachers who wish to provide effective instruction about energy. In the retrospective opinion of the evaluators, both teacher and student studies were necessary to assess the impact of the materials. It is recommended that others consider the dual strategy since it is conceivable that the separate results may not be mutually reinforcing.

Energy education is a relatively new curricular area rising in response to an acute societal problem. Only a few evaluation efforts on this topic have been reported (Battelle, 1979; Niedermeyer and Roberson, 1979). In quickly implemented projects, temptations are strong to slide over evaluation efforts in the rush to completion. The conclusions stated here demonstrate that valuable evaluation information, both formative and summative, can be obtained through appropriately designed evaluation efforts without hindering tight timelines.

Observations

State departments of education often address a pressing social problem by developing materials that will be used on a voluntary and supplemental basis. Frequently, funding agencies or urgent need impose serious time constraints. Evaluators are then posed with the choice of evaluating one aspect of the project in depth or evaluating the total impact of the project with less depth.

This paper reported on one effort to evaluate voluntary and supplemental materials both formatively and summatively. Outcomes for both students and teachers were studied. Although the numbers of students and teachers were small in all aspects of the evaluation, valuable conclusions were reached and communicated to the intended audiences.

It would appear useful at this point to consider evaluation approaches used in similar efforts such as career education, drug education, or arts education. In these areas, as in energy education, decisions must be made about the amount of money and time to invest in evaluation. Some situations seem to require rigorous data collection regardless of the cost in time, money, or inconvenience to participants. Perhaps other state department personnel have found that in-depth, systematic, expensive evaluation of all aspects of a project is not possible or does not produce results in time to influence on-going decisions. If this is the case, it would appear likely that broad based evaluation efforts with less depth, such as those described in this paper, would be useful. Timeliness was a crucial factor in both the formative and summative phases of this evaluation. One definition of a successful evaluation in a state education agency is to have adequate evaluative data available at the time decisions are made. The broad based design chosen for this evaluation made it possible to meet the necessary deadlines.

Another interesting and informative aspect of the evaluation described above is the way the summative results were communicated to the intended audiences. In state education agencies, as in other institutions, evaluation results are most useful when reported in a form that is geared to the intended audience. In the case of this evaluation effort, the results were reported in a variety of ways.

A formal report, A Study of the Impact of Selected Lessons from the Energy Education Curriculum on Students (1979), was prepared for the funding agency and for energy educators, so they would be fully informed about both procedures and results. A separate briefing report about the student and teacher outcomes was prepared for the Indiana Commission on General Education since it was felt that this audience would be interested in a brief summary report of only the results. A press release highlighting the General Commission report was sent to all media in the state and was reported widely in newspapers, and on radio and television. The press release included responses to individual questions as well as general results so that it would "come alive" for the general public. When the complete publication, *An Energy Curriculum for the Elementary Grades*, was mailed to all school superintendents, a letter describing the student impact study was enclosed. Finally, this paper and possible articles to appear in professional journals have been geared to the interests of educators interested in energy and evaluation. In this project, the evaluators felt that the extra effort to prepare a variety of reports was worthwhile since all of the audiences would have some impact on the future of education.

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THE ENVIRONMENTAL PROTECTION CAREERS GUIDEBOOK*

Jules Spector

"Practical" sides of environmental education include both getting on about the business of improving the environment and providing education for career opportunities in environmental areas. The U. S. Environmental Protection Agency and the U. S. Department of Labor collaborated in 1981 in the publication of an Environmental Protection Careers Guidebook, designed to assist young people in identifying career and training opportunities in the field. The paper below, by Jules Spector of U. S. Department of labor, was presented at the National Conference on Meeting Environmental Workforce Needs, organized and conducted by Information Dynamics, Inc., in Washington, DC, in February 1981.

Concern for the quality of the air we breathe and the water we drink are reflections of changed attitudes about ourselves and our environment. This concern is reflected in the many changes which are seen in occupations relating to environmental protection.

The Environmental Protection Careers Guidebook, a publication developed as a major counseling and guidance document by the United States Department of Labor and the United States Environmental Protection Agency was made available to the public in February, 1981. It fully reflects the many changes and opportunities found in the field of environmental protection. This document describes, in detail, 106 occupations that have resulted from the growing interest in environmental protection. Many of the occupations included in the Guidebook have never been described before, and a number are clearly described for the first time. In addition to describing the tasks and responsibilities of each of the 106 occupations, complete information is given on education and training requirements for each occupation, as well as the prospects for employment.

Covers Seven Fields

Most of the occupations described are in one of seven environmental fields: water and wastewater treatment; noise control; air resource management; land, fish, and wildlife management; pesticides and toxic substances programs; solid waste management; and radiation control.

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*In *Meeting Environmental Workforce Needs: Determining Education and Training Requirements*. Silver Spring, MD: Information Dynamics, Inc., 1981, pp. 301-303 (ED 205 802). Reprinted by permission of Information Dynamics, Inc.

In addition to detailing the major responsibilities of workers in these fields, pertinent information is given on places of employment, areas of specialization, and the particular worker characteristics helpful to effective performance. Also presented are licensing and certification requirements.

A review of some of the occupations described demonstrates the extensive occupational coverage of the publication.

Water and Wastewater Treatment: Chemist, Water Purification: Supervisor, Waterworks; Water-Filter Cleaner; Industrial Waste Inspector; Microbiologist; Treatment-Plant Mechanic; TV Technician, Wastewater Collection; and Ditch Rider.

Noise Control: Audiologist; Audiometrist; Noise Engineer; Noise Specialist; and Noise Technician.

Air Resource Management: Air Chemist; Air Engineer; Air Scientist; Air Technician; Air Technician, Meteorology; and Biometrician.

Land, Fish and Wildlife Management: Conservation Officer; Fish Biologist; Forester; Land Planner; Park Ranger; and Wildlife Biologist.

Pesticides and Toxic Substances: Agricultural Chemicals Inspector; Agricultural Pest Control Specialist; Entomologist; Entomology Field Assistant; Environmental Epidemiologist; Industrial Hygiene Chemist; Pesticide Use Medical Coordinator; Toxicologist; and Vector Control Assistant.

Solid Waste Management: Refuse Collection Superintendent; Resource Recovery Engineer; Sanitation Inspector; Waste Management Engineer; and Waste Management Specialist.

Radiation Control: Chemical Radiation Technician; Emergency Services Radiation Coordinator; Health Physicist; Radiation Laboratory Technician; Radiation Protection Engineer; and Radiological Instrument Technician.

Other Environmental Activities: Chemical-Laboratory Technician; Engineering Aide; Engineering Technician; Environmental Economist; Environmental Lawyer; Industrial Hygiene Engineer; Laboratory Aide; Occupational Health Nurse; and Physician.

Educational Aspects

The Environmental Protection Careers Guidebook deals extensively with the education aspects of entrance into the field. An extensive list of Postsecondary Environmental Education Programs is included, both by type of Pollution area and by State. This list in the most extensive published to date.

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Also included in the Appendix is a presentation on environmental legislation and financial and technical assistance.

A glossary of 53 terms specific to environmental protection in included, providing the user with the definition of such terms as: Bioassay; BOD, or Biochemical Oxygen Demand; Dosimeter; Sand Filters; Tertiary Treatment; and Vector.

New Occupations "Discovered"

The "discovery" of a large number of new environmental protection occupations, a byproduct of the development of the Guidebook was less of a chance factor than it would seem. In development of the publication reliance was placed on available resources relating to environmental protection and particularly the EPA's expertise in performing job analysis studies in the field was utilized. Through this process of analysis, utilized by the U.S. Employment Service of the Department of Labor, all areas relevant to the universe of environmental protection were covered. Where a new occupation came to light, a complete, on-site job analysis was made of all the tasks and related factors of that occupation. This information was incorporated into a Job Analysis Report which will also serve as resource for future editions of the Department's Dictionary of Occupational Titles. At the same time the information was developed into a narrative format for incorporation into the Guidebook. The descriptions of the environmental protection occupations, including the newly incorporated materials, have an importance which extends beyond the counseling and guidance design of the Guidebook. Because of the extensive information not elsewhere available, the Guidebook serves an important function in areas of legislation, staffing programs, educational program development, and the overall employment process. Researchers will find the publication a unique source of information on both occupations and the universe in which they occur. Through the Guidebook the field of environmental protection can be measured and examined with a completeness not before possible.

Copies of the 205-page Environmental Protection Careers Guidebook can be obtained (Stock No. 029-014-00205-4), from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. It also is available from ERIC (ED 196 700).

THE CASE FOR COMPREHENSIVE STATE AND LOCAL ENERGY EDUCATION POLICIES*

State Energy Education Project, Education Commission of the States

With support from the U. S. Department of Energy, the Education Commission of the States (ECS) has for several years performed analyses of the status of energy education in the United States and has worked toward development of sound energy education policies and practices. The paper below, a chapter from one of ECS' documents, provides a rationale for state and local initiative in energy education.

What is Energy Education?

The purpose of energy education is to enable people to understand basic energy concepts and to make informed decisions regarding energy conservation, development and utilization with an understanding of options and consequences. The following six objectives and associated topics comprise a comprehensive energy education program that meets this general goal.

1. To enable people to understand the nature and importance of energy.
    a. Energy forms (heat, light and motion) and states (potential and kinetic).
    b. Energy sources (depletable and renewable).
    c. Energy uses (heating, cooling, manufacturing, transportation, lighting, etc.).
    d. Energy flows (extraction, distribution, use and dispersal).
2. To provide information about changing supply and demand factors for various energy sources.
    a. Historical trends.
    b. Present conditions.
    c. Future possibilities.
    d. Mathematical implications of growth.

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*Excerpted from *Energy Education: A Policy Development Handbook*, Report No. 42 from the Education Commission of the States, Denver, CO, 1981, pages 1-6. (ED 207 831).

3. To prepare people to consider the individual and societal implications of different energy sources at the local, regional, national and international levels.

   a. Economic implications.

      1. Supply, demand and price of energy and related goods and services.
      2. Employment ramifications.

   b. Political implications.

      1. Domestic.
      2. International.
      3. National security.

   c. Social/lifestyle implications for various sectors of society.

   d. Environmental impacts.

   e. Scientific and technological considerations.

      1. Centralized and decentralized production systems.
      2. Renewable and non renewable sources.

4. To provide information about conservation.

   a. Rationale for conservation.

   b. Conservation techniques.

5. To prepare people for potential energy supply disruptions.

   a. To anticipate potential disruptions.

   b. To make contingency plans.

   c. To participate in the public decisionmaking process.

6. To prepare people to be energy-conscious in their careers.

   a. Energy-related occupations.

   b. Other occupations.

A comprehensive energy education program contains numerous interrelated components that can be introduced as basic concepts and can be carried to increasing levels of complexity. While energy concepts can be taught in specialized courses, it is not necessary to isolate energy education as a separate discipline; instead, it can be infused into a wide range of existing curricular subjects at virtually all grade levels. The important consideration is that students develop competencies associated with the above list of objectives, regardless of instructional organization. (For a more extensive discussion of the content of energy education and implementation guidelines see a companion ECS document, Energy Education: Why, What and How (ED 211 347).

Why Is Energy Education Necessary?

Historically, education in the United States has had both individual and societal goals: to prepare students to realize their individual potentials and to participate responsibly in society as citizens, workers, consumers and family members. While an educated person requires such skills as reading, writing, and arithmetic, fulfilling our traditional educational goals requires more than these basic tools. An educated person also needs a sense of civic responsibility, decisionmaking skills and factual information upon which to base both individual and group action. And, for knowledge to meet contemporary demands, curricular content must relate to an evolving societal context.

Within the last 10 years, energy has become central to the national consciousness and to individual expectations. Traditional assumptions regarding continual improvement in material well-being are being challenged by unpredictable supplies and unprecedented costs for the energy upon which the American lifestyle is based. With respect to fossil fuels, the United States is experiencing a painful transition from abundance to possible scarcity, from cheap to expensive and from national independence to dependence - and perhaps back again. With respect to alternate energy sources, people are polarized by controversy over nuclear safety and are confused by conflicting claims over the potential costs and benefits of solar energy. Meanwhile, nobody is immune from the ravages of an inflationary economy which has been exacerbated by spiraling energy costs. Meeting the multifaceted challenge that the energy transition presents requires an informed citizenry capable of making responsible decisions about the development and use of alternative energy supplies having various economic, political, social and environmental consequences. Such a requirement suggests that energy be considered a basic theme throughout the formal (in-school) and informal (out-of-school) education systems, as energy issues are immediate, serious and pervasive.

Why Is Energy Education Policy Useful?

A policy is a principle or set of principles designed to guide subsequent decisions and actions. Policy guidelines set priorities, determine the allocation of resources and help to effectuate education reform. Policies can be explicit or implicit, official or assumed. They can be of a general supportive nature or can specify in detail those actions, i.e., programs, necessary to implement the policy intent. Policies can establish mandatory requirements or make optional recommendations. Formal policy is issued in the form of a statement, directive, statute or briefing. The selection of an appropriate format depends upon specific goals and available resources.

Policies supportive of energy education can do any or all of the following:

1. Indicate a high level of official commitment to the goals and objectives of energy education, thereby encouraging and accelerating the process of program development and implementation at the state and local levels.

2. Provide guidance for developing and implementing energy education programs.

    a. Philosophical guidance (goals and objectives).

    b. Programmatic guidance (content and sequence).

    c. Assessment guidance (needs determination and program evaluation).

3. Provide the basis for appropriate support and assistance.

    a. Financial support.

    b. Technical/informational assistance.

    c. Staff training.

    d. Materials.

4. Influence behavioral changes.

    a. Through provision of incentives (rewards).

    b. Through regulation (required courses and/or competencies).

5. Define responsibilities of and relationships among involved agencies and individuals, thereby avoiding needless duplication of efforts and/or omissions.

    a. Through cooperative agreements.

    b. Through assignments consistent with capabilities and resources.

6. Encourage linkages.

   a. Among agencies (education, energy, natural resources, etc.).

   b. Among sectors (education, government, business, industry, labor, etc.).

   c. Between school and community and among various education settings.

   d. Among various levels of schooling.

   e. Among subject areas.

Why State-Level Policy?

Education is the United States is ultimately a state responsibility, with considerable authority delegated to local school borads acting in compliance with state guidelines. While the federal government has assumed an education role in areas of national concern, the current political and fiscal climate connotes a decline in federal support for and regulation of education. Concomitantly, state responsibility for funding education programs has grown in the past decade, and that trend is expected to continue throughout the 1980s.

Concern for productive utilization of public funds suggests that increased state involvement, often in the form of technical assistance to facilitate local district capacity building, may follow increased state support. Therefore, the importance of state-level commitment to energy education in terms of formal policy is important. For, the absence of explicit policy is also a form of policy--generally a policy of neglect.

Why Local-Level Policy?

Effective policy is a guide to action. Without action, a policy does not serve its intended purpose. In education, learner involvement constitutes the action, the ultimate goal of an education policy statement.

Within the broader parameters of state energy education policy, a local education agency can formulate and implement its own energy education policy. Policy framed at the local level serves several needs. First, it incorporates the thinking of local professionals, thereby enhancing their involvement and assuring that the policy meets the district's unique needs. Second, it is an expression of local commitment. (An absence of policy at the local level, even where one exists at the state level, can also be perceived as a policy of neglect.) Finally, its proximate power infuses the issue with a sense of immediacy and accountability, influencing local professionals to act.

Imbued with the power delegated by the state and with an understanding of their specific needs, local policymakers reach through the classroom door and touch the child. In so doing, they make state policy more effective.

THE SHARED LOCAL RESOURCES ENERGY INSTITUTE MODEL*

John E. Steinbrink and Robert M. Jones

Many energy and/or environmental education efforts are suffering severe withdrawal symptoms as federal and state resources have become less and less available; in some cases, such dimunition in support has been fatal. Others, however, have sought--and found--alternative support mechanisms at the local level. This paper, prepared at the University of Houston at Clear Lake City, details how that institution has energized local resources in teacher energy education efforts.

A central theme of this paper is that a new approach is needed to develop effective energy education programs. The days of waiting for federal or state educational energy agencies to exert either curricular or financial leadership similar to the "big project" days of the 1960's is over. After briefly describing the UH-CLC Energy Curriculum Institute experiment, this paper will present a detailed description of the Shared Local Resources Model and provide examples of its application in energy education.

The UH-CLC Energy Curriculum Institute

At UH-CLC we have conducted Energy Curriculum Institutes for educators during the past four summers (1978-81). These institutes are intensive, full-day experiences lasting two weeks in which the participants are exposed to numerous speakers, films, and learning activities that treat some aspect of energy. All 70 participants receive 3 hours of graduate credit.

The institutes are funded by the Shell Companies Foundation, Inc. In 1981 the educator participants received a stipend that paid for tuition, building use fees and parking fees ($89.75).

Three characteristics that have contributed to the success of the institutes can be identified:

I. Primary Speakers and Materials

Primary speakers and materials form the basis of the program. For example, rather than having a local government professor speak on the role of the United States in the global energy community, we have been able to obtain a U.S. Department of State speaker who has been and is involved in representing the United States in several international energy projects.

Presented at the National Conference on Energy Education at the annual meeting of the National Council for the Social Studies, Detroit, November 1981. (ED 210 170).

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In using primary speakers, it is important to identify people who are skilled communicators. Our experience has shown that teachers are not tolerant of technical experts who read long, uninteresting papers.

II. Focus on Instruction/Contract Grading.

Participants are required to complete a project in order to earn an A. The projects should help the participants infuse energy into their classrooms. Participants design their own project in consultation with one of the instructors. Examples of participant projects in 1981 include:

- Three energy learning centers developed by a team of four fifth grade teachers from one elementary school.
- An interest center on "energy mathematics" developed by a fifth grade math teacher. This center, which contains 18 separate activities, is being used by all four fifth grade teachers in a local school.
- An instructional unit on "energy careers" developed by an eighth grade CVAE teacher.
- An instructional unit on "Energy and Chemistry" developed by a chemistry teacher in the Houston ISD Vanguard (Magnet School) program.
- A detailed analysis ("term paper") on the controversial South Texas Nuclear Project and nuclear power in general.

Several participants were given extra time to complete their projects in order to qualify for an A grade. The final grades in 1981 consisted of 45 percent A and 54 percent B.

III. Comprehensive, Balanced Perspective

Great care is given to presenting a balanced perspective. A speaker from the nuclear industry is balanced by anti-nuclear literature and films. Participants are encouraged to ask controversial questions; speakers are expected to be candid and open.

Many energy topics are discussed. Topics for speakers and films have included: the annual government and industry econometric energy forecasts; solar powered satellites; nuclear power; geothermal energy; energy financing, domestic and global; OPEC; low technology solar systems: active and passive.

Other topics are introduced on a timely basis. Topics vary from year to year depending on the availability of speakers.

The Shared Local Resources Model

The UH-CLC Energy Curriculum Institute Model, as it has evolved the past four years (1978-81), is based on three key assumptions:

- Effective energy education depends on teacher education programs and the development of energy literate educators.
- Effective energy education for teachers will be based increasingly on cooperative efforts between teacher educators (universities), school districts, energy companies and their associations, federal and state agencies, environmental groups and other interested individuals and organizations.
- Effective energy education will be funded increasingly by private sources rather than public agencies and these private sources will usually be local energy companies.

Based on these assumptions, significant support in the form of speakers, materials and field trips has been received by UH-CLC during 1981. The following groups have participated in the UH-CLC concept of the Shared Local Resources Model:

- NASA. The Johnson Space Center of the National Aeronautics and Space Administration (NASA) provided the Project Engineer from the Solar Power Satellite Program as a speaker along with multiple copies of pamphlets describing the several NASA energy related projects and programs. In addition, teachers were encouraged to bring their students to the Johnson Space Center facility for field trips.
- National Science Teacher Association. Approximately 22 of NSTA's Project for an Energy-Enriched Curriculum (PEEC) instructional modules were distributed to the participants. Instructional units at all grade levels in many content areas were available. These materials were described, demonstrated and analyzed by Professor Jones of the institute faculty; he is an author of two of the PEEC units: Appropriate Technology in Energy for Advanced Students, Grades 11-12, and Critical Thinking About Energy for General Science and Social Studies, Grades 10-12.
- Houston Lighting and Power Company. HL&P provided two speakers, including their chief spokesman for nuclear power, and multiple copies of several booklets and pamphlets. In addition, HL&P provided a bus that took 32 participants on an all-day field trip to the South Texas Project nuclear generating site near Bay City, Texas. Following an extensive tour of the facility conducted by nuclear operators who are in training, HL&P provided lunch for the teachers on the return trip to the campus.
- American Museum of Science and Energy. The American Museum of Science and Energy at Oak Ridge, Tennessee in cooperation with Oak Ridge Association Universities and the U.S. Department of Energy has developed a curriculum project, Science Activities in Energy, which

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consists of eight different units in separate folios. Multiple copies of each unit were provided for institute participants. These colorful and innovative materials, which were designed for upper elementary and middle school learners, are popular with institute participants.

- Armand Bayou Nature Center. During a visit to the nature center, the director gave an overview of energy flows in natural systems followed by a slide presentation about the nature center. After a presentation of the "Dance of Life"--an environmental play using the teacher participants as "actors"-- the teachers were free to browse through the exhibits, to inspect the passive solar design features of the Armand Bayou Nature Center building, and to walk on the nature trails. Information about bringing school groups to the center and membership materials were distributed and discussed.

- University of Houston at Clear Lake City. UH-CLC provides funds for the instructors' salaries for the Energy Curriculum Institute from the funds generated by student enrollment formulas. Thus, while the instructors are teaching the institute their actual instructional salaries are paid by the university, not the Shell Foundation. Moreover, during the regular school year the instructors devote approximately 15% of their total time to the Energy Awareness Project. This time is "donated" to the project by the university.

Conclusion

While many teacher educators have agonized over the demise of federal support for curriculum development and teacher education, there are alternative approaches. This paper has described a model that stresses maximum cooperation and interaction with many types of energy and energy related organizations. We are convinced that the future belongs to those who are innovative and self reliant.

References

John E. Steinbrink and Robert M. Jones, "Humanistic Learning Environments: The Development of a Local Energy Institute Model," Contemporary Education, Vol. 52, No. 2, Winter 1981, pp. 93-96.

FUNDAMENTALS OF ENVIRONMENTAL EDUCATION*

Subcommittee on Environmental Education,
Federal Interagency Committee on Education

A framework of fundamentals about the environment was developed in 1976 by the Environmental Education Subcommittee of the Federal Interagency Committee on Education, as an expression of that group's concept of what environmental education is and should be. Quoting from Beatrice E. Willard's "Introduction" to the Committee report: "A functional grasp of the fundamentals concerning the operation of ecosystems assists citizens in obtaining a clear, systematic, scientific, dispassionate picture of the world around them. This framework is designed to help achieve that capability for understanding, coordination, and action necessary for a balanced approach to improving environmental quality as mandated by the National Environmental Policy Act of 1969 (NEPA). This framework can be used to provide criteria for surveying, coordinating, initiating, and redesigning federal programs and activities. It can provide criteria for designing, implementing, and evaluating programs, activities, and materials in the broad field of environmental education at all levels. It can provide utility in defining divisions of labor in the public and private sectors. It can facilitate communications and decisions from the individual to the multinational levels. This document is not designed as a syllabus, but as a basis from which can emanate a wide variety of materials, activities, and programs." The excerpt below is the outline developed by the Subcommittee.

Section I. Fundamentals About Earth's Environment

A. Earth's environment is a whole.

   1. The natural conditions on Earth that support the development and maintenance of ecosystems are a function of Earth's place in the solar system and the structure of Earth.

      a. Solar energy is the primary source of energy for all the physical, chemical and biochemical cycles and other processes occuring on Earth. Secondary sources of energy include nuclear processes, tidal, gravitational, and geothermal sources.

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*From *Fundamentals of Environmental Education: A Paper Developed by the Subcommittee on Environmental Education of the Federal Interagency Committee on Education*. Washington, DC: Office of the Assistant Secretary for Education, U.S. Department of Health, Education, and Welfare, November, 1976. (ED 133 296).

b. Earth absorbs energy from the sun and radiates energy into space. It is in a state of overall energy balance.

c. The influx and distribution of solar energy gives rise to the climates that prevail on Earth. It powers the movement of global air masses, the hydrologic cycle, ocean currents. It provides conditions essential to the life on Earth.

2. Earth's environment constitutes a complex interrelated, interactive life support system called the "ecosphere."

B. The ecosphere is a dynamic, constantly changing macro-system--a mosaic of ecosystems.

1. The ecosphere is composed of interacting systems called ecosystems.

a. An ecosystem is a recognizable, homogeneous unit of the ecosphere and exists at a particular point in space and time. Each ecosystem consists of three groups of components: (1) physical factors (sun's energy, climate, rocks, water, etc.); (2) living organisms, including humans; and (3) interaction among and/or between living and nonliving components (competition, erosion, decomposition, etc.)

b. Each ecosystem has "system" characteristics that derive from the interactions of the system's components and differ from the characteristics of individual components. Therefore, the system functions in ways that cannot be understood by studying only its parts.

c. Ecosystem processes are limited by such physiochemical attributes as the availability of energy, materials, space, time, and the inherited characteristics of organisms.

d. The characteristics of each individual organism depend upon interactions of its genetic composition with its total environment.

e. These characteristics fit each population to function in particular roles known as "niches." Populations are interdependent with one another and with their physical environment, impacting upon and being impacted by each other and their environment.

f. Both ecosystems and species vary in their ecological amplitude, i.e., their parameters and capacities to interact with other components of the ecosystem and with other ecosystems.

2. The ecosphere and all its ecosystems undergo continuous change.

   a. Throughout its history, Earth has undergone and continues to undergo extensive changes in environmental factors, such as climate, topography, geologic processes and distribution of oceans and continents.

   b. Organisms have changed greatly through small consecutive modifications of their genetic composition, thus adapting to their environment. Such changes continue to occur through time and space. Extinction of species has resulted from failure to adapt to environmental change.

   c. Ecosystems arise as organisms invade formerly lifeless water, or bare mineral substrates (rocks, sand), or as pre-existing ecosystems are modified. New combinations of organisms and environments produce new ecosystems. As ecosystems operate through time, their living and nonliving components contribute to, interact with, and change the character of the system. Natural and human processes (fires, landslides, earthquakes, urbanization, etc.), alter ecosystems in varying degrees. Ecosystems have various degrees of resiliency to alteration, giving them varying capacities and rates of recovery from alteration. If a given ecosystem is perturbed enough, by removal of old or addition of new components and change of processes, it can be reduced to near or actual extinction. However, some type of ecosystem subsequently will develop unless the area is rendered toxic to all life for extended periods.

   d. As an ecosystem persists and matures through long periods of time there is a tendency toward an increase in the diversity of organisms. In mature ecosystems, a steady-state character persists, even though individual organisms and species arrive, die, or depart, and even though particular kinds of organisms may not always be present. In general, complex mature ecosystems are more resilient to physical, biological, economic, and social variations than developing systems and generally are more stable.

   e. Niches become more specialized as ecosystems mature. Changes in ecosystems interact with changes in organisms, resulting in greater specialization of niches. Some species have expanded their niches by learned behavior. These changes enable more types of organisms to live in the ecosystem, thus further changing its character.

   f. Some characteristics of an ecosystem are influenced strongly by its origin and history.

C. The energy and materials necessary for all life are components of each ecosystem.

1. Energy used in all ecosystems comes originally and primarily from the sun; materials come from components of the ecosphere.
2. Green plants, through photosynthesis, use the sun's energy to convert water, carbon dioxide, and small amounts of minerals into high-energy organic compounds that power all life processes. This energy is released by the processes of respiration in organisms. Both of these processes (photosynthesis and respiration) are limited to fairly narrow ranges of temperature, moisture, and chemical conditions, and by the genetic composition of organisms.
3. Materials are cycled and recycled via foodwebs through plants to herbivores to fewer carnivores, etc. Ultimately they are reduced by many decay organisms to inorganic forms, completing the cycle, as materials are reused. Examples are the nitrogen and carbon cycles.
4. Some energy moves through the physical and chemical components of ecosystems; the rest flows through foodwebs. No energy conversion is 100 percent efficient, so energy is constantly dissipated from the system. This dissipation of energy results in a deficit. A constant infusion of additional energy is required for organisms and ecosystems to live and grow. The sun provides this energy. Some energy is stored in organic materials that can be used in the future.
5. Most natural ecosystems are adapted to operate on the energy and materials directly available to them. These resources are renewable by recycling; in natural ecosystems, the rates of consumption and renewal are balanced. While primitive human social groups are similarly adapted, modern man-made systems require heavy subsidization of energy and materials.

D. Each ecosystem includes a number of species populations, the size and stability of which vary, depending on biotic and abiotic changes in the system.

1. When a population is introduced into an ecosystem to which it is adapted, the excess of births over deaths results in a typically S-shaped pattern of growth. Growth levels off as birth and death rates equalize; decline occurs as death rate exceeds birth rate.
2. Birth rate and death rate are influenced by factors intrinsic and extrinsic to the population ("limiting factors"). Intrinsic factors are genetic (reproductive capacity, innate behavior, food requirements, resilience, etc.). Extrinsic factors are

environmental. They include chemical factors (nutrients, toxins, etc.) and physical factors (temperature, humidity, etc.), as well as factors related to interactions with its own and other populations (competition, predation, parasitism, etc.). Density of a population affects all of these extrinsic relationships.

  a. For modern humans, birth rate is affected primarily by socio-cultural means (e.g., delay in marriage, contraception, abortion, etc.); death rate during infancy, childhood, and even adulthood is affected by technology (e.g., medical science, sanitation, dietary improvement, etc.). While both have changed in recent times, the net result has been a substantial increase in size and growth rate of the world's human population.

3. The size of a population in an ecosystem will vary from time to time with changes in physio-chemical factors and with biologcal interactions, thus defining the "carrying capacity" of the ecosystem for that population under a given set of conditions. To a degree, an ecosystem's carrying capacity can be increased by technology, but only within finite limits.

4. Spatial arrangements of individuals in populations are as important in ecosystem functioning as total numbers of individuals in the population.

5. Ecological amplitude, environmental barriers to dispersal, and history control distribution of populations.

Section II. Fundamentals Concerning Humans as Ecosystem Components

Organisms influence the characteristics of ecosystems and are, in turn, strongly influenced by the characteristics of the ecosystems in which they live. Humans now are the most influential of the Earth's organisms and influence all of Earth's ecosystems.

A. Humans use ecosystems to satisfy basic needs and desires:

1. The basic biological needs that must be met for humans to live and to grow and for the species to survive:
  a. Habitable climate--temperature range, moisture, etc.
  b. Energy and materials--food, air, water, organic chemicals, etc.
  c. Rest and exercise.
  d. Other humans for reproduction.
  e. Protection against environmental stresses--sun, wind, rain, disease, etc.

2. Among humans, essential psychological and social needs and desires requiring fulfillment include security, love, esteem, self-fulfillment, social interaction, health, comfort, material goods, religious experiences. Humans cannot grow and completely develop mentally unless these needs are met.

3. Human cultures each have their own perceived needs and desires that make different demands and impacts on ecosystems. In time of stress, many of these needs and desires can be adjusted.

   a. Universal human desires for more and more material goods are expressed differently in different cultures. As the satisfaction of these desires increases, human impact on ecosystems increases.

   b. Value systems play a highly significant role in determining the kind and extent of a society's impact on ecosystems.

   c. Increasing the consumption of energy and materials often leads to deleterious impacts on ecosystems.

      (1). Increased CO_2 and heat in atmosphere, e.g., heat islands over cities.

      (2). Albedo, e.g., increased reflectivity of incident light.

      (3). Introduction of new synthetic substances that produce an effect that is an order of magnitude different (and often adverse) on living systems, e.g., chemicals that are toxic, mutagenic, carcinogenic, either chronic or acute.

   d. Concentration of humans, especially in built environments, intensifies the deleterious effects of humans on ecosystems.

   e. Among culturally specific perceived needs are:

      (1). Preservation of land, ecosystems, and species, together with conservation of materials and energy.

      (2). Satisfaction of desires for status and for exotic materials and experiences.

      (3). Economies of scale concentrating human activities that result in major changes in ecosystems.

      (4). Planned obsolescence of manufactured goods.

      5. Dietary customs, family size, work attitudes.

B. Humans affect ecosystems, as an all-pervasive species in the ecosphere that has a special type of ecological dominance, exerting major kinds of influences on ecosystems.

1. Human domination results from:

    a. Intellectual capacities that permit the development of:

        (1). Technology that gives unique control over energy flows, food and goods production, disease, and other factors that would otherwise limit human populations.

        (2). Unique institutional and technological control over other populations in ecosystems; e.g., domestication of some species--pigs, dogs, cows; suppression of "undesirable species"--rats, mosquitos, dandelions, etc.; and encouragement of "desirable species"--Kentucky bluegrass, shade trees, pheasants, deer, etc.

    b. Biological and cultural adaptation to a wide range of environmental conditions, which greatly increases effects of humans on ecosystems ranging from improvement to destruction.

        (1). The built environment on a metropolitan scale constitutes a major change in kinds of human settlements.

    c. Sheer population size.

    d. Great specialization and diversity in the division of labor.

2. Human tendencies to form and function in social and corporate groups and institutions promote development of human habitats that currently create unique concentrated demands on ecosystems and further increase human effects on ecosystems.

    a. These effects are augmented by concentration of humans into small areas, such as metropolises.

    b. Human settlements on a metropolitan scale have effects on ecosystems that rival those of mountains, glaciers, droughts, and floods.

3. Burgeoning human populations and technological capabilities are of relatively recent origin. This increasingly rapid growth and development has brought to ecosystems increasingly rapid changes, some of which are potentially irreversible.

4. Human aesthetic, ethical, moral, and spiritual values reinforce and/or conflict with harmonious relationships within ecosystems.

C. Ecosystems affect humans, as the arenas in which all human perception and activity take place.

1. Humans and all their products function in an ecosystem framework.

    a. The built environment radically transforms human society and culture--as space, as function, as sensory stimulus, as motivation, as support, as hazard.

    b. Past ecosystem processes and events have produced major biological and cultural differences in human populations.

2. Changes in the ecosphere due to increasing human numbers and technology have short- and long-term effects, e.g.,

    a. Short-term effects on:

        (1). Birth and death rates.

        (2). Biological fitness of human populations as measured by growth rates, disease patterns, nutritional levels, aging, etc.

        (3). Use of non-renewable materials and stored energy sources.

        (4). Functional capacities of individuals and populations--mental productivity, attitude, etc.

        (5). Renewable resources.

    b. Long-term effects on:

        (1). Genes and chromosomes and their evolutionary consequences.

        (2). Selection pressures--elimination of some and/or introduction of others.

        (3). Ecosystem changes resulting from evolution of their component populations.

        (4). Health and life cycles.

        (5). Global climate.

        (6). Reserves of non-renewable and renewable resources.

        (7). Culture.

3. Although several species exhibit non-genetic information transfer, the built environment and the psychological milieu have a powerful effect on humans because information transfer by verbal and learned behavior is such a large part of the contemporary human environment. They operate on humans in a parallel and synergistic manner in much the same way as do physical and chemical components of ecosystems.

D. Complex interactions among humans and other ecosystem components occur continuously.

1. Humans' perceptions of their needs, their impacts on ecosystems, and ecosystem impacts on them reflect the cultural and individual values, goals, skills, insights, and capabilities of the individuals, groups, institutions, and nations involved.

2. Relationships among components of ecosystems are reciprocal, ranging from mutually beneficial to unidirectionally destructive.

3. A governing relationship among and within components of ecosystems is a feedback mechanism (physical, chemical, social, behavioral), ranging from highly sophisticated to rudimentary.

4. Human activities often have synergistic effects on ecosystems and vice versa.

5. Human activities present both solutions and problems for ecosystem maintenance and management.

   a. Potentially positive activities of humans within ecosystems, some evidences are:

      (1). Domestication and husbandry of plants and animals.

      (2). Reduction of disease and mortality.

      (3). Constructed and controlled space for living, working, manufacture, storage, recreation, transportation, etc.

      (4). Preservation of genetic stocks of non-domesticated organisms and preservation of specific ecosystems.

      (5). Perception and appreciation of ecosystems and their components.

      (6). Development of human law and property rights.

      (7). Reduced human populations under certain social-cultural conditions.

      (8). Elaboration of functional roles (i.e., niches) for humans, which increases diversity of ecosystems.

b. Potentially destructive activities of humans within ecosystems, some evidences are:

(1). Discrete large scale events that warn of imbalances between human activities and ecosystem functioning (e.g., changes in atmosphere, marine oil slicks, dustbowls, floods, etc.).

(2). Decreasing numbers of individuals, declining continuity and area of ecosystem-type, and reduced average species diversity for given ecosystem type (e.g., decline of predatory birds and mammals, of tall grass prairies, etc.).

(3). Increases in environmentally-induced human health problems (e.g., pollution-induced disease, noise-induced deafness, etc.).

(4). Destruction/modification of habitats, creation and concentration of pollutants, and other inadvertent or deliberate acts.

(5). High rates of energy dissipation and production of pollutants in heavily urban areas.

(6). Depletion of relatively concentrated sources of raw materials.

E. Human ability to comprehend both the basic concepts about ecosystem processes, and the consequences of human actions in relation to ecosystem processes, short- and long-term, must be coupled with their ability to control their actions, in order to produce an ethic of accountability for human impacts on ecosystems. The preservation of civilizations as we know them depends on the exercise of an ethic of accountability for human impacts on ecosystems, balanced with the realization that humans require modification of the natural environment (housing, vehicles, agriculture, extensions of communication--e.g., books, radios, TV, etc.) which, even if primitive and crude, allows humans in small groups to extend culture beyond the mere survival level.

Section III. Methods for Harmonizing Human Activities with Ecosystem Processes to Achieve Environmental Quality.

Using the fundamentals of environment outlined in Sections I and II, this section focuses on ways to implement positive actions for harmonizing human activities with ecosystem processes. This section is especially applicable in the United States, but has relevance elsewhere in the world.

A. The methods by which human activities, local through global, are harmonized with ecological processes are complex and outcomes are not always predictable. Effects of ecosystem changes on human biology and culture are inevitable, ever present, and of limited susceptibility to management. Detailed knowledge needed to make environmental predictions often is incomplete or unavailable. There are not uniformly dependable social-political processes for responsible decision-making. The ways that societies pursue harmonization include:

1. Education of the public, formal and nonformal.
2. Appreciation and practice of various art forms in sensitizing humans to different types and facets of environmental quality.
3. Encouragement of corrective actions by individuals, businesses, government agencies, etc.
4. Voluntary adoption and implementation of policies and standards.
5. Establishment of formal policies, guidelines, and standards.
6. Use of economic and social incentives.
7. Enforcement of policies, guidelines, and standards.

B. Institutions, processes, and attitudes for implementing investigative, preventive, remedial, and creative actions that will harmonize human activities with ecosystem processes are:

1. Education and communication.
2. Religious, aesthetic, ethical, and moral influences.
3. Science and technology.
4. Civic and social institutions.
5. Governmental and political processes.
6. Industry and commerce.

C. One basic process for harmonizing human activities with ecosystem processes involves adjusting perceived imbalances, identifying and addressing problems, and utilizing opportunities through institutions and individuals:

1. Investigating ecosystem processes and components, including results of human activities on ecosystems and the influences of ecosystems on human functioning.
2. Recognizing the importance of ecosystem processes and significance of ecosystem changes.

3. Identifying causes of ecosystem changes and their consequences.

4. Arraying alternative action strategies that would maintain and enhance beneficial ecosystem changes and would stop or reduce detrimental changes, with special attention to irreversible/irretrievable changes, and to long-range vs. short-range commitments of resources.

5. Analyzing and evaluating alternatives within a broad array of environmental, social, and economic criteria, recognizing that criteria and values will differ according to the circumstances of politics, geographic location, scale, time, and society (war, good times, flood, famine, etc.).

6. Selecting among alternatives and adopting a policy. (This occurs at individual through global levels, consciously and unconsciously.)

7. Choosing and implementing actions to carry out policy.

8. Monitoring and evaluating effects of implemented policies and actions.

9. Feeding information from step #8 back through step #1, etc., to keep actions adjusted to changing data bases, requirements, conditions, and perceptions.

D. Increasing scientific knowledge of ecosystem processes in the United States and the world, coupled with increasing citizen awareness of ecosystem disfunctions and acute environmental problems, led to establishment of policies and enactment of environmental legislation in the 1960's, which were augmented and adjusted in the 1970's.

1. The U.S. National Environmental Policy Act of 1969 incorporates a number of the fundamentals of environment into its Title 1, as part of the policy, building natural principles into U.S. law. Incorporation of these principles into U.S. law places a special mandate on human actions today and in the future. Title 1 of NEPA reads as follows: (Emphasis is added to indicate portions that state fundamentals presented in Sections I and II of this paper.)

   "101a. The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

"101b. In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may--

(1) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

(2) Assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;

(3) Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

(4) Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice;

(5) Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities, and

(6) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources."

2. Other U.S. laws address specific needs for harmonizing various results of human activities with ecosystem processes, e.g.,

    a. Environmental Education Act of 1970.

    b. Refuse Act of 1899.

    c. Clean Air Act of 1966 and Amendments of 1970, 1974, 1976.

    d. Water Quality Act of 1966 and Amendments of 1972.

    e. Federal Insecticide, Fungicide and Rodenticide Act of 1971, and Federal Environmental Pesticide Control Act of 1972.

    f. Coastal Zone Management Act of 1972.

g. Marine Mammal Protection Act of 1972.

h. Endangered Species Preservation Act of 1973.

i. Marine Protection, Research and Sanctuaries Act of 1972.

j. Solid Waste Disposal Act of 1965, and Resource Recovery Act of 1970, Solid Waste Amendments of 1976.

k. Noise Control Act of 1972.

l. Non-Nuclear Energy Research and Development Act of 1974.

m. Forest and Rangeland Renewal Resources Planning Act of 1974, and Amendments of 1976.

n. Toxic Substances Control Act of 1976.

o. Whale Conservation and Protection Act of 1976.

3. International environmental policy is exemplified in:

a. Resolutions of the 1972 Stockholm Conference on the Human Environment.

b. Work of the United Nations Environment Programme.

c. Convention on Oil Spills, Trade in Endangered Species, World Heritage Trust, Ocean Dumping.

d. Revision in Law of the Sea Convention.

e. Resolutions of the 1975 Kyoto Conference on the Human Environment.

f. Resolutions of U.N. Conferences:

(1) Population, Bucharest, 1974.

(2) Food, Rome, 1974.

(3) Women's Rights, Mexico City, 1975.

(4) Human Settlements, Vancouver, 1976.

g. Results from future U.N. Conferences:

(1) Water, Mar del Plata, Argentina, April 1977.

(2) Environmental Education, Tbilisi, Russia, October 1977.

(3) Desertification, 1977.

h. Recommendtions of U.N. Agency Workshops:

(1) Environmental Education, Belgrade, 1975.

(2) Mediterranean Pollution, Barcelona, 1976.

i. Bilateral and multilateral environmental agreements, such as US-USSR Bilateral Environmental Agreement of 1972.

Section IV. Using Fundamentals of the Environment Given in Sections I and II, and Understanding of the Methods Outlined in Section III.

Some of the questions that must be addressed, and some of the issues that must be resolved, are:

A. Questions

1. What are the minimum per capita requirements for a quality human experience throughout life?

2. What energy resources are needed to meet these minimum per capita requirements throughout a human life span?

3. What is the food production capacity of Earth with known technologies?

4. What natural and man-made material resources are needed to meet these minimum per capita requirements throughout a human life span?

B. Issues:

1. Land suitability planning.

2. Strip mine land reclamation.

3. Protection of ecosystem processes affecting food production.

Conclusion

Costs of insults to organismic systems and to ecosystems are paid by all in reduced health, as well as lowered organic and work productivity. The most equitable way to pay these costs must be worked out by the time honored democratic processes. A sound economy and a clean, healthy environment became reciprocally reinforcing by application of human ingenuity and restraint.

THE OUTDOOR CLASSROOM*

Dorothy E. Thomas

A pre-service and in-service teacher education project making use of locally available resources, including consultants from federal and state resource management agencies and an appropriate site, is described in this short paper, which demonstrates the development of symbiotic relationships between and among individuals and groups when an activity of common interest is initiated. The author is director of the project.

Summary

Elizabeth City State University, in cooperation with the United States Soil Conservation Service and the North Carolina Department of Forestry, established in 1974 an Outdoor Classroom to prepare pre-service and in-service teachers to utilize vital natural resources as an outdoor laboratory. The area involves a tract of approximately 15 acres of wooded land in close proximity to the University campus. The area had remained undisturbed by man for a minimum of 200 years, and was at one time covered by the waters of the Atlantic Ocean. Many unusual growth patterns of plants, relics of Indian culture and an abundance of resource material are available. Students are guided in procedures to be utilized in the selection of study areas, trail markings, plant identification, plant successions, soil profile studies, plant and animal relationships, soil testing activities, and the relationships of abiotic and biotic factors. Students then assist public school teachers in establishing outdoor laboratories on their campuses. In-service teachers are encouraged to permit students to summarize and evaluate indoor classroom units with the use of guided tours that give first hand experiences in collecting, identifying and solving individual and group problems. It provides outdoor experiences for classes and community groups from kindergarten through college. The Dismal Swamp State Park Reservation Ranger Naturalist has expressed interest in having University students engage in individual and group research projects. The Outdoor Classroom has done much to establish vitally needed rapport with the public schools and the community at large.

**Prepared at Elizabeth City State University, Elizabeth City, NC, 1976. (ED 171 435).*

Comprehensive Explanation (Of The Outdoor Classroom)

A. Description and Development of the Program

The need for an outdoor laboratory became evident because so many pre-service and in-service teachers have had very little experience with knowledge concerning the environment. Also, the State of North Carolina strongly supports a program of environmental education. The United States Soil Conservation Service and the Department of Forestry heartily applaud the environmental education efforts and have actively supported these projects.

The geographic location of Elizabeth City State University makes it especially suitable for the study of diversity and ecology because of its close proximity to the Great Dismal Swamp and the Atlantic Ocean. Emphasis is placed on "how to" projects, such as: how to "set up" a nature trail, how to determine study areas, how to conduct field studies, how to collect, identify and maintain living organisms in the classroom, what ecological problems are peculiar to Eastern North Carolina and how a study of these problems may be incorporated into our indoor classroom courses.

The initial procedures involved permission from University administrative officers to utilize the area to set up an outdoor laboratory. A committee was organized, composed of: a local conservationist, a State forester, the University Business Manager, the Superintendent of Buildings and Grounds, the Vice Chancellor for Academic Affairs, Chairmen of the Departments of Biology, Industrial Arts, Art, Environmental Science, a biology major, a representative from the local newspaper, and a radio station employee. Members of the group met and surveyed 19 study areas. These were points of interest and problem solving stations. A trail was marked to connect these points and a path 3 feet wide was cleared. Strong bridges were constructed across ditches and low areas. Wood chips, donated by a local lumber company, were used to cover the trail. Stations or points of special interest were numbered on boards and placed on trees beyond the reach of vandals. Local foresters assisted with tree identification. A bridge or miniature observation tower was constructed over a swamp area to provide a safe area of study without fear of a thick, watersnake habitat. A section of a ditch near the observation tower was enlarged and deepened to form a permanent pond. Tree identification labels, cut in the shape of leaves, were painted a light green color and the common and scientific names were imprinted. Financial assistance was requested from the University, industrial firms, clubs, civic clubs and teachers.

The following areas were included as study areas: weather station, an area of plant identification, a living "shell" of a tree, a bird hotel (a standing dead tree that provide nesting sites for birds), loblolly pines (with use of increment borers to make ring studies), fused trees showing a rare example of two species (a sweet gum and an oak) growing together, resurrection fern, jack in the pulpit, aquatic study area (a small stream), flood plain and water shed study, a soil profile, a fallen tree (showing root structure soil layers, and the beginning of plant successions), large trees (climax vegetation), fungi on standing tree, a decayed log, cypress trees and cypress "knees," pond and bridge, plant successions, natural pine seeding and an outdoor shelter.

B. Objectives and Goals.

The Outdoor Classroom is designed to:

1. Serve as a laboratory for all studies in the curriculum including biological, physical and social sciences as well as the humanities and vocational education;

2. Assist pre-service and in-service teachers in learning how to "set up" outdoor laboratories;

3. Provide an economical practical "hands on" source of materials for teaching;

4. Direct students in problem solving techniques;

5. Assist public school classes, clubs and civic organizations in acquiring increased knowledge concerning the environment and its interrelationships; and

6. Improve lines of communication between the University and the community. (For program's wider influence in teacher education see items E and F.)

C. Personnel Involved.

Persons involved in the program include Mrs. Dorothy E. Thomas, Project Director; Mr. Frank Veach, Area Soil Conservationist; Dr. Sekender A. Khan, Chairman of the Department of Biology; Dr. Maurice Powers, Professor of Geology; Mr. Herb Krase, Local Forester; Mr. Harvey L. Thomas, Superintendent of Buildings and Grounds; Members of the classes of Methods of Teaching Biology, and public school principals.

D. Budget

Listed below is the budget:

Weather Station and Equipment	$1,000.00
Outdoor Shelter	1,250.00
Bridges	200.00
Entrance Sign	50.00
Directional Signs	20.00
Paint	30.00

Cameras, Films, and Projection Equipment	$1,000.00
Duplicating Supplies	50.00
Chain Link Fence Around Weather Station	300.00
Labels for Tree Identification	20.00
Total	$3,920.00

Sources of funds are: The University Office, Vice Chancellor for Academic Affairs' budget, Maintenance Department budget, Western Electric Corporation and Union Camp Corporation.

E. Contributions to the Improvement of Teacher Education

Participants have expressed much enthusiasm about the project. Classes in Art, Geology, Mathematics as well as Biology and Chemistry have utilized the Outdoor Classroom for practical experiences, learning laboratories and motivation incentives. Several civic organizations and public school classes have been directed on tours by members of methods classes in Biology. Student teachers have assisted in-service teachers in setting up outdoor classrooms. The local newspaper devoted a full page to pictures and explanations concerning the project. Radio Station, WGAI, on several occasions has played a 30 minute tape on a guided tour through the Outdoor Classroom. Boy Scout groups have selected the area for projects such as building bird houses and squirrel nesting boxes. The Outdoor Classroom was included in the brochures for the Bi-centennial tours for Elizabeth City. Teachers from public schools have been supplied with teaching supplies (cultures, etc.) from the project. Students have been able to solve such problems as an understanding of the quantitative and qualitative tissue requirements of plants for growth (exhibited in the "shell of a tree") and the significance of re-cycling, cypress knees and successions.

F. Evaluation Methods and Results

The Project Director has been invited to conduct two one hour lecture-slide presentations for the annual meetings of the North Carolina Science Teachers Association for two consecutive years (1975-76). She has also been invited to present a one hour lecture - slide presentation on "Creative Experiences in Using the Outdoor Classroom" for the annual meeting of the National Science Teachers Association, Cincinnati, Ohio, March, 1977. During each of these presentations copies of guidelines to be used in setting up similar projects were issued and explained to each participant.

Six lecture - slide presentations have been given.

Eight guided tours for public school classses (kindergarten through college) have been conducted.

Five departments in the University have utilized the Outdoor Classroom.

One guided tour was conducted for a Boy Scout Group.

One guided tour was conducted for personnel of the Museum of the Albemarle.

It is highly recommended that others who wish to set up similar programs organize an initial planning committee that would include representatives from the United States Soil Conservation Service, the North Carolina Department of Forestry, and the Public School System as well as local school personnel.

In order for such a project to be effective it should be under the control or sponsorship of the Board of Education or Board of Trustees and should be located within walking distance of the school grounds.